

# MODERN Machine Shop

A MAGAZINE FOR MACHINE SHOP EXECUTIVES

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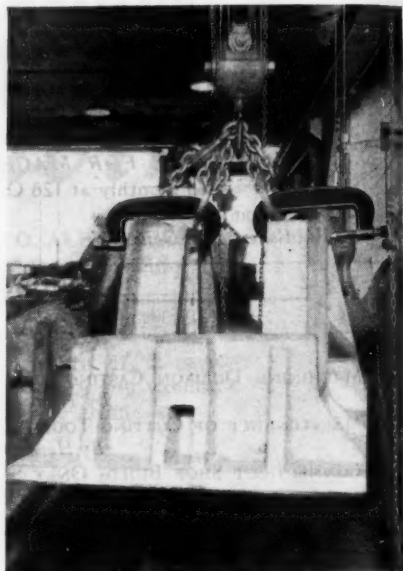


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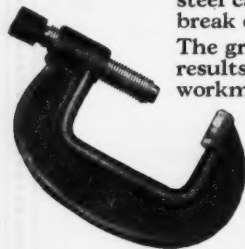
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# MODERN Machine Shop

AUGUST, 1929

CINCINNATI, OHIO

VOL. 2, No. 3

## Machining Duriron Castings

By HOWARD CAMPBELL

**M**OST acids will attack and eventually destroy the ordinary metals such as cast iron, steel, brass, copper and lead, consequently the frequent replacement of metal equipment in plants or institutions where acids and alkalis are handled once constituted an important problem. This problem has been largely eliminated by the development of "Duriron," which is a product of The Duriron Company, Inc., Dayton, Ohio. Duriron is an iron-silicon alloy containing small percentages of carbon, manganese, and other elements, the composition being so balanced as to produce a metal with a maximum of acid-resisting qualities combined with reasonable strength and resistance to shock. It is produced in castings only, and is used for manufacturing acid valves, pumps, kettles, pipe and fittings, exhaust fans and special equipment which is used throughout the chemical and process industries, including laboratories, steel mills, oil refineries, paper mills, flour mills, tanneries,

sugar mills, vegetable oil mills, and so on.

While the silicon gives the iron

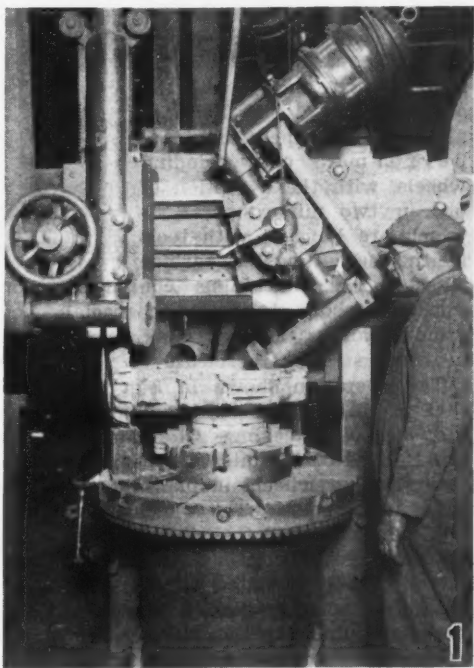


Fig. 1—Finishing the surface of a pump casing.

the ability to resist corrosion, it also makes it extremely hard. In fact, it

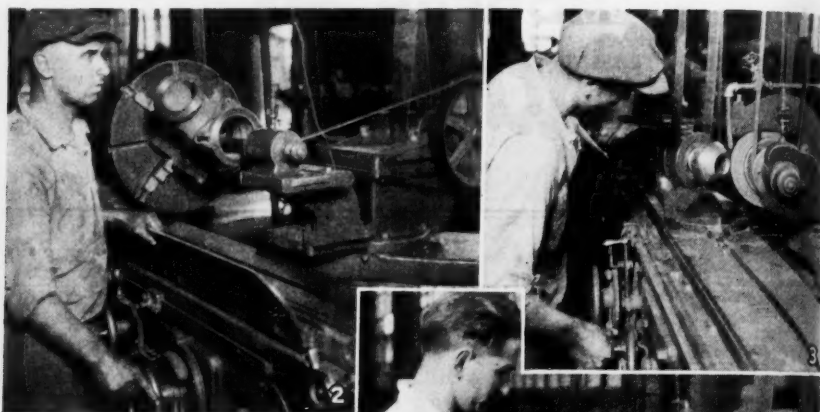


Fig. 2—Grinding a 60-degree angle seat in a Y-valve. Fig. 3—A spherical "seat" is ground on the stem. Fig. 4—Finishing the valve stem to size.

is too hard to be cut with the ordinary tool steels, therefore all finishing operations are performed with grinding wheels, with the exception of one or two minor operations which are handled with tools of the new tungsten carbide alloys. The machining equipment consists of both standard and special grinders and attachments, as shown in the illustrations herewith.

The operation shown in Fig. 1 is that of finishing the valve chamber face in a pump casing. The machine is a Bullard boring mill equipped with two grinding wheels in place of the usual tool holders. The wheel at the left, which is used to grind the face or "parting surface," is driven from a motor that is mounted on the ram; the other wheel, which is shown in process of finishing the impeller face, is driven by a motor with which it is mounted as a unit that can be swung to any desired angle. A 36-M wheel is used.

The valves made by this company

consist principally of two parts—the body and the valve stem. To obtain a perfect seal, the valve seat in the body is ground to an included angle of 60 degrees and that part of the stem which forms the contact is ground to the form of a sphere. Thus the necessity of perfect alignment is eliminated, as the valve will "seat" at any angle within certain limits. The operation of grinding the seat in a 4-inch Y-valve is shown in Fig. 2. A Cincinnati Universal No. 3 grinder is used with an internal grinding attachment, the wheel slide being set so that the wheel is fed in at the correct angle.

The illustration Fig. 3 shows the operation of grinding the spherical seat on the "ball" end of the valve

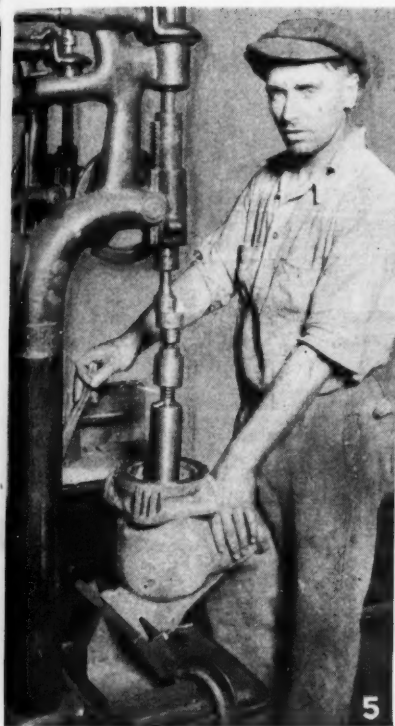


Fig. 5—Lapping-in the stem to the body.  
Fig. 6—Finishing the outer face of an im-  
peller casting for a pump.

stem, which is done with a Brown & Sharpe grinder. The stem is held in a special fixture which allows the chuck, holding the work, to be swung radially while the operation is in process. As the ball is located directly over the axis of the moveable part of the fixture, a spherical surface is ground on the ball as it is swung around. The fixture is adjustable for any size of valve up to four inches in diameter. An 80-M silicon carbide wheel is used on this operation, and the work revolves at a speed of 250 r.p.m. The stem proper is ground in a Cincinnati grinder, as shown in Fig. 4.

After the valve body and stem have been ground, the stem is lap-

ped-in to the body as shown in Fig. 5. The body is clamped to an angle plate, and the stem is revolved by the drill press spindle, to which it is attached by means of a coupling which can be adjusted to impart an eccentric motion to the valve. The lower half of the coupling screws onto the threaded shank on the end of the stem, and the upper half carries a taper shank which is inserted in the machine spindle. A key on the lower half fits into a corresponding slot in the lower end of the upper half, a setscrew being provided to lock the key in place. By throwing the lower half of the coupling out of line with the upper half, the stem is made to revolve with an eccentric motion. A mixture of fine carborundum and oil is used for lapping.

The piece shown in process in Fig. 6 is an impeller casting for a pump,

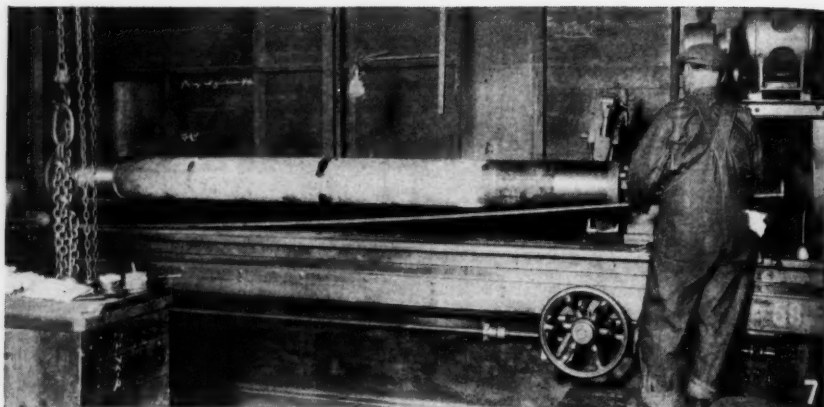
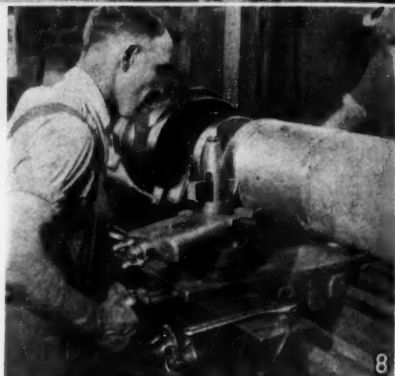


Fig. 7—The ends of this Duriron tube are finished by grinding in this machine. Fig. 8—Cutting a groove in the tube to hold a wire for a removable head. A tungsten carbide tool is being used.

the outer face of which is being finished by grinding. The piece is held in a fixture that carries a threaded stem upon which the impeller is mounted, thus providing for perfect alignment of the face with the axis. A Norton Crystolon 36-M wheel is usually used for this operation.

One of the large Duriron tubes to be used in a nitric acid still is shown in Fig. 7, in process of having the ends finished. Each end is ground back to approximately eight inches from the end so that the packing will fit snugly around it when the still is assembled. One of the few instances



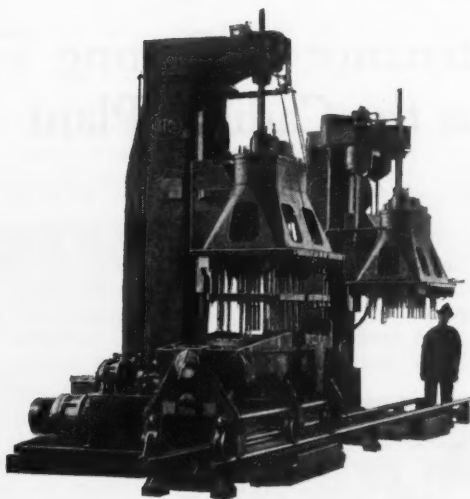
where a tool is used to cut Duriron is illustrated in Fig. 8, where an operator is shown using a tungsten carbide tool to cut a groove in the surface of one of the large tubes.

## Grinding Steel Castings

Steel castings are smoothed up and billets have seams removed by coarse-grained, fairly hard wheels made with aluminous abrasive. A typical grain and grade would be 14-R. A coarse grain is used because it cuts more rapidly than a finer size, and finish is no object. A hard rather than medium grade is used because the vibra-

tion and pounding incident to rough grinding would make the medium grade wear excessively fast and thus cause a very high wheel cost. They do not go to grade Z to reduce wheel cost still more because grade Z would get so dull and cut so slowly that overhead and labor costs per unit of product would become excessive.

—(Norton Company)



## 15 TRACTOR FRAMES DRILLED, REAMED AND TAPPED EVERY HOUR

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This installation which includes one standard Natco Hydraulic Multi-driller and one special vertical Natco Multi-tapper shows another example of Natco Greater Production equipment being used to lower production costs.

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# Maintenance of Cutting Tools at the Cadillac Plant

By HERMAN ESTELMAN,  
Foreman, Cutter-Grinding Department, Cadillac Motor Car Co.

**T**HE ability to maintain production schedules in the machine shop and at the same time produce work of the quality required by Cadillac engineers depends to a large extent upon the efficiency of the cutting

been found to produce the best results for the job upon which it is used, the concentration of this work in one department makes possible the close supervision which is necessary for best results.

From 2,000 to 2,500 tools are handled daily, for which a force of from 40 to 45 men and approximately 75 machines are required. Every effort is made to eliminate

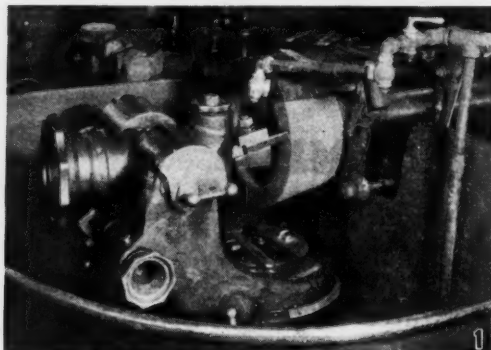


Fig. 1—All crankshaft lathe tools are ground in this machine. Fig. 2—Worn-out slitting saws are reclaimed by re-cutting the teeth in the Cincinnati cutter grinder

tools. Therefore, in order to simplify as much as possible the task of keeping these tools in order, all grinding of tools and cutters is handled in a central cutter-grinding department where the work can be done under the personal supervision of the head of this department.

High speed steel, Stellite, and the newer cutting tools of tungsten carbide alloys are used exclusively, and as each tool must be ground to the limits, angles, and shapes which have

the possible hazards and provide sanitary working conditions; all grinding wheels are guarded as efficiently as possible and a blower system keeps the air practically free from dust. The workmen are also required to wear goggles when working at the machines, thus minimizing eye accidents. No serious lost-time accident has happened in this depart-

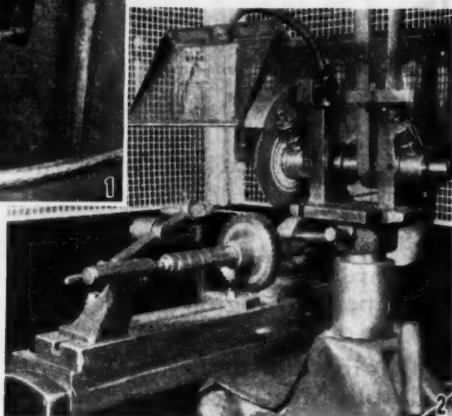


Fig. 2—Cutter grinder machine used for re-cutting the teeth in worn-out slitting saws.

ment in the last ten years, and the average continuous length of service per man averages over five years.

As, with few exceptions, each machine in the manufacturing department operates continuously on one operation, two or more sets of cutters

keeper of the tool supply room. Each tool or set must be accompanied by a ticket on which is recorded the kind of tool, number of tools in set, and work required. This ticket is stamped with the correct time as the tools enter the grinding room, thus providing a record which eliminates possibility of future argument with the production foreman.

Practically all tool and cutter grinding is done on a piece-work basis, which, instead of tending to make the workmen careless, has

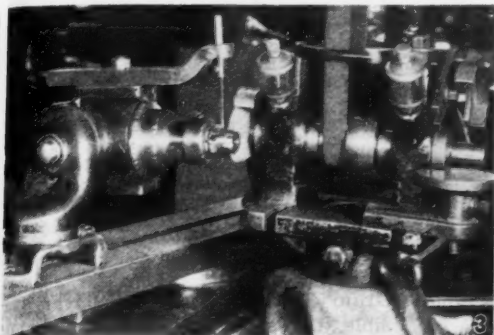
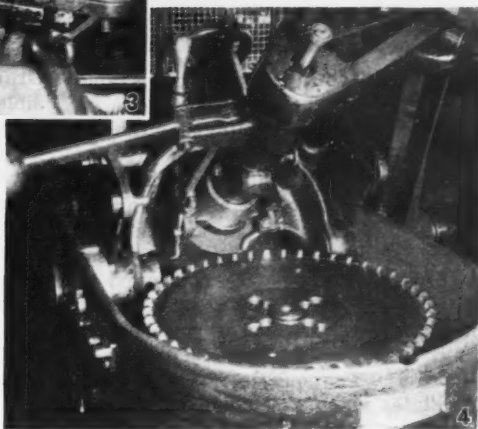


Fig. 3—Grinding a multiple-diameter cutter. Special gages insure that the correct step will be maintained. Fig. 4—Grinding a large, inserted-blade face-milling cutter, used for milling aluminum crankcases.



are maintained for each machine, the extra cutters being stored in a tool supply room which is provided in each department for that purpose. When a cutter, or set, becomes too dull for further economical use, it is exchanged at the tool supply room for a sharp set.

The dull tools, including reamers, hobs, broaches, inserted blade cutters, drills, taps, dies and all other types of cutting tools, are collected at scheduled intervals by truckers who at the same time distribute the tools which have been sharpened and are ready for use. Very large cutters, which are too cumbersome for easy handling, are exchanged at the machines, although the order to sharpen them must be obtained from the

had the effect of making them more careful. As each job is completed, the tool is inspected for size, clearance, angles and general workmanship. If the work is satisfactory, the inspector signs the operator's work ticket; if the tool has not been ground according to specifications, the work ticket will not be O. K'd for payment until the tool has been reground. Not only is the same amount of work which formerly required approximately seventy-five men now being handled by from forty to forty-

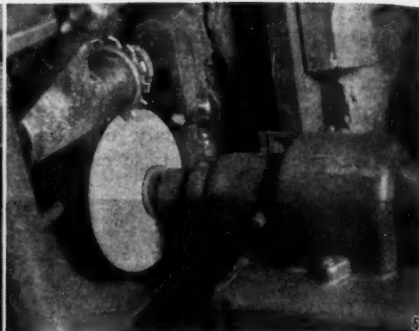


Fig. 5—The cutters used on Gleason gear generators are sharpened in this special Gleason automatic cutter grinder. Fig. 6—A concave cutter set up for grinding. The correct relation of the cutting edges and rake are obtained by the use of dial indicators.

five men, but the department is able to obtain much better men, due to the fact that the earnings of the individual workman are much greater.

The grinding equipment includes machines for grinding all the various kinds of tools used in the machine shop. The special lathe tools used in turning crankshafts are ground on the special lathe tool grinder shown in Fig. 1. The wheel is a Carborundum 12/10x6x5½-inch, Grain 30, Grade P. The spindle of the machine oscillates when the machine is in action, thus providing for even wear on the wheel and assuring a smooth, flat surface on the tool. The tool shown in the machine is being ground with a rake of 15 degrees and clearance of 5 degrees. A plentiful supply of soda water is provided to prevent checking of the high speed steel.

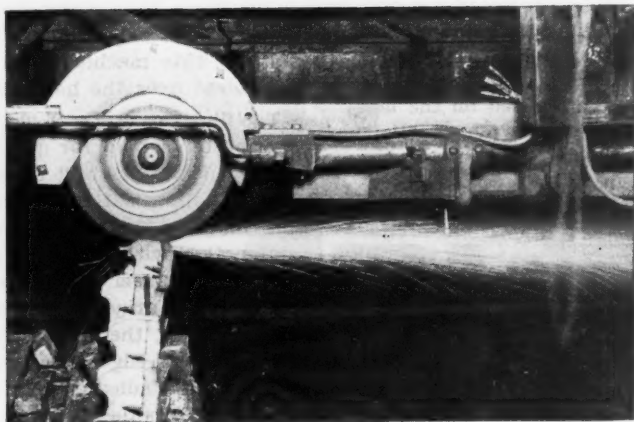
The illustration Fig. 2 shows how worn-out slitting saws are reclaimed by re-cutting the teeth. This machine is a No. 1½ Cincinnati cutter grinder, equipped with a special ball-bearing spindle which runs at a speed of 4,000 to 5,000 r. p. m. The wheel is 7x¾x1¼-inch Norton Alundum,

Grain 46, Grade DK. Whenever possible, the saws are recut, or "gummed," in gangs in order to save time. Care must be taken not to heat the saws, otherwise the temper will be drawn and the saws will be rendered useless.

Multiple-diameter cutters are ground on the No. 1½ Cincinnati cutter grinder shown in operation in Fig. 3. These cutters are ground to special gages, thus insuring that the correct step will be maintained. The clearance on the faces of the counterbores is usually held to 5 degrees for steel and cast iron, and 8 to 10 degrees for aluminum. All counterbores, countersinks, end mills, milling and half side milling cutters, as well as all small inserted blade cutters, are ground on these Cincinnati grinders, of which there are thirty-five in this department. The wheel shown in use in the illustration is a Norton Alundum, 3¼x1¼x½-inch, Grain 3860, Grade K.

All large inserted-blade face-milling cutters from 4½ inches to 24 inches diameter are ground on machines similar to that shown in Fig.

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4. The cutter shown in process is used for milling aluminum crank-cases. A clearance of 10 degrees is ground on these blades, and the maximum variation allowed on the height of the teeth is plus or minus .001 inch. A  $10 \times \frac{1}{2} \times 1$ -inch, Grain 401, Grade P-25 Carborundum Aloxite wheel is used on this machine.

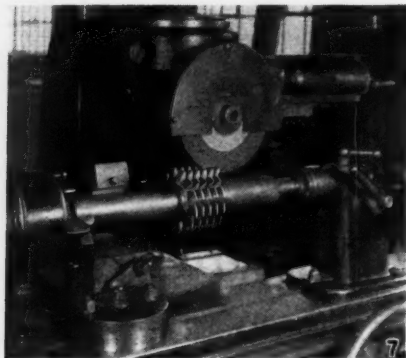


Fig. 7—Grinding a hob. Each job is carefully inspected after grinding for gash angle, rake, radius, out-of-round, and grinding checks.

The 6, 9 and 12-inch cutters used on the Gleason gear cutting machines are sharpened on the Gleason automatic cutter grinder shown in Fig. 5. As the accuracy and quality of the gears generated with these cutters depends largely on the grinding of the cutters, they must be ground smooth and accurate. A cut of approximately .010 inch is taken with one pass of the wheel, after which the cutter automatically indexes to the next tooth. A good flow of soda water is directed at the point of contact between the wheel and cutter-blade to prevent the burning of the blade. A  $14 \times \frac{3}{4} \times 7$ -inch, 60 degrees bevel, Grain 1900, Grade K, Norton Alundum Vitrifired wheel is used, in which eight grooves have been cut to make it cut more freely. After

the grinding, the cutters are carefully checked for height of blades and radius. This machine is a vast improvement over the hand grinder.

The illustration Fig. 6 shows a concave cutter set up for grinding. All radius cutters, as well as all special formed milling cutters, are ground in this machine. A finger, working in conjunction with a dial indicator, locates on the heel of the tooth being ground; by grinding all teeth the same amount, the correct relation of the cutting edges is maintained. Another dial indicator determines the rake of the tooth. These cutters are held to a limit of plus or minus .0005 inch for out-of-round. Soda water is used as a coolant. The wheel used is a Norton Alundum,  $8 \times \frac{3}{4} \times 1 \frac{1}{4}$ -inch, Grain 3846, Grade K.

All straight and spiral angle hobs, as well as thread hobs, are ground on the machine shown in Fig. 7. The wheel is a Norton Alundum,  $8 \times \frac{1}{2} \times 1 \frac{1}{4}$ -inch, Grain 3846, Grade K, dressed with a diamond to insure the smooth finish which is essential for the production of good gears. Care has to be taken not to take too heavy a cut, otherwise the hobs, which are of high speed steel, will check in grinding and the teeth will break out when cutting gears. Each hob is carefully inspected after grinding for out-of-round, gash angle, rake and radius, for which purpose special gages and fixtures with dial indicators are provided.

To the person who is not familiar with high-production plant methods, these few illustrations will serve to indicate the care that is taken to make sure that at least one set of sharp, accurately-ground cutters is instantly available for any machine.



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## Connecticut Shop Builds Only Special Machinery

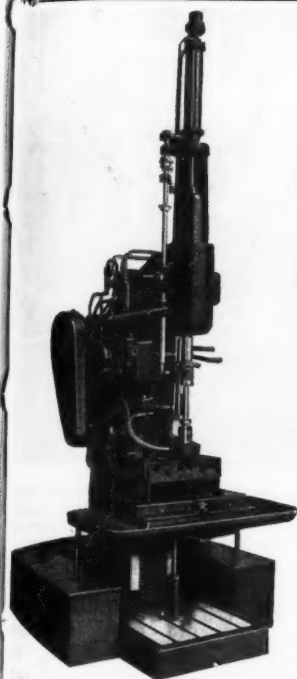
By CHESTER KENT

**I**N times gone by, the building of special machinery was exactly what the term implies—a special job. Every manufacturing establishment, big or little, maintained somewhere within its own precincts a special department—generally called the machine-room—the purpose of which was to care for the mechanical equipment of the mill or factory and to make whatever was needed in the way of tools and appliances pertinent to the main business of getting out the regular product, and upon the rare occasions when the “old man” could be convinced that the extra expense was justifiable, the burden (as well as the honor) of designing, constructing and putting into operation whatever might be required in the way of special machines would usually devolve upon this department.

Equipped as they were with a single eye to the main duty of general repairs, these small “machine shops” were seldom well adapted to the building of special machines; never-

theless the progressive manufacturer who recognized the immense advantage to be derived from the use of such machines in his business was forced to avail himself of their limited resources for the simple reason that outside concerns which made a regular practice of building single machines to order were few in number, and—if the truth is to be told—but little if any better qualified to handle such work than his own modest department.

Few of us “old-timers” who learned our trade in one or another of these hole-in-the-wall machine shops (and by virtue of the very diversity of the work they were called upon to turn out they were by no means to be despised as training schools) but can remember one or more such machines under construction; worked upon by all hands in turn in odd moments when the demand for repair work slackened off and the “boss machinist” (we didn’t call him the “mechanical superintendent” then) would



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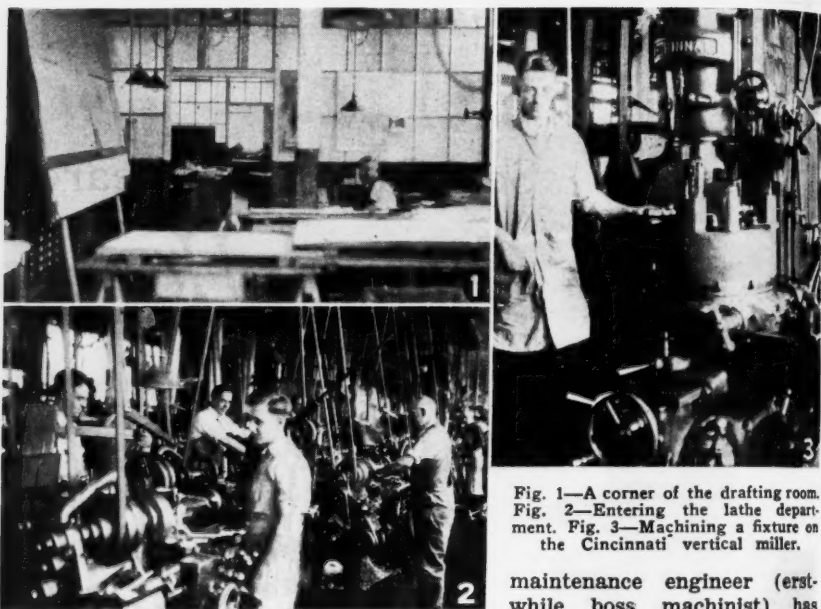


Fig. 1—A corner of the drafting room. Fig. 2—Entering the lathe department. Fig. 3—Machining a fixture on the Cincinnati vertical miller.

otherwise have been hard pressed to find something for the men to do. "Knitting work" we used to call it, for the reason that it was always available to keep idle hands out of mischief.

All this has changed in the last twenty-five years. The gradual merging of the once universal small steam power plants into the huge generating units of the present day, the decadence of the water wheel prime mover as the demand for power exceeded the capacity of the individual wheels, and the increasing costs of transportation have relegated the cost of power to the status of a minor consideration, and the substitution of the ubiquitous electric motor with its direct drive for the long lines of shafting, the whirling pulleys and the flapping belts the care of which once constituted the major problem of the

maintenance engineer (erstwhile boss machinist) has put the old-time machine shop practically out of business. In its place has come the fully equipped independent machinery-building establishment wherein the functions of a dozen or a hundred machine shops are blended into one system and each special machine or tool, however large or however unimportant, has become a manufacturing proposition.

In a loft building on Grove Street in the city of Hartford, Connecticut, a building that housed the humble beginnings of many a small shop that has later developed into a factory of world-wide repute—the Hartford Special Machinery Company was established in the year 1911 to take care of the construction work from the engineering offices of Joseph Merritt. Mr. Merritt had for some years previous been engaged in business as a consulting engineer and designer of special tools and machinery, but up

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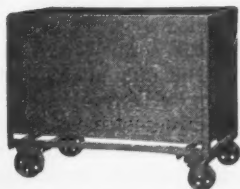
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**No. 24-20 Lathe Chip Pan**—16 gauge black sheet iron with four casters. Made in various sizes. Strongly built.



**No. 24-24-40 Box Truck**—For inter-factory and shop transportation. Hand riveted joints. Capacity 1,500 pounds.



**No. 3020 F Closed Body Truck**—Particularly useful where small parts are handled in bulk. Sturdily braced, large, heavy-duty casters. Capacity 1,200 to 2,000 pounds.

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**PLAINWELL MICHIGAN, U.S.A**

*Agents and Dealers in Principal Cities*



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**ANGLE STEEL STOOL CO., Plainwell, Mich.**  
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☐ Send New Catalog "C-M.S." of Angle Steel Equipment.

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Address.....  
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to this time his work had been confined to design, the drawings of the tool or machine being turned over to some one or other of the small shops to be worked out in iron and steel.

With many jobs in simultaneous progress in as many shops, under the direction of different foremen and performed by workmen who were not under his control, Mr. Merrit experienced the difficulties that might reasonably be expected to arise under those circumstances, with the result that he hired a small room in the building above mentioned, fitted it with machinery suitable to his work, and with half a dozen men at his command undertook the actual fabrication of his designs in his own shop and under his direct personal supervision.

Under the new arrangement the business increased rapidly, and within the year the little shop had spread to include one whole floor of the building. After another year two floors

were necessary to accommodate it, and in 1915, four years after its inception in the one small room, a site was purchased on Homestead Avenue and a modern factory building erected. The building as shown in the headpiece of this article has been twice enlarged and now contains practically three times the floor space of the original.

As may be seen in the illustration, the factory is of brick, one story in height, and with a generous proportion of its wall space of glass. The additions were made by building on at the end of the original building so that the problem of lighting is in no way complicated by increased shop width. All of the window panes with

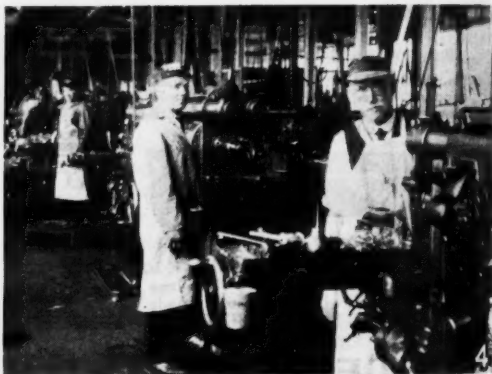
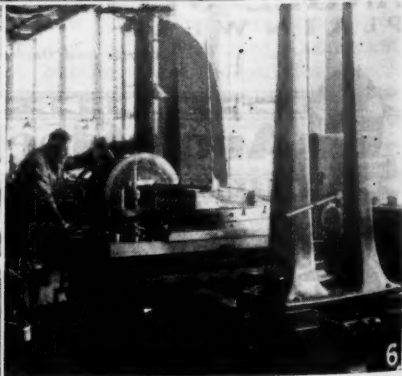
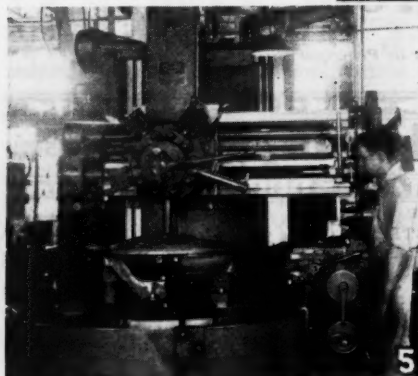


Fig. 4—A group of "Milwaukee" millers provides for quality and quantity. Fig 5—One of the Bulard vertical turret lathes. Fig. 6—What the rest can't handle, these horizontal boring machines can.



THERE IS A

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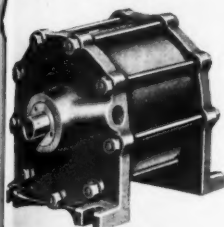
*For Every Requirement!*

THE elimination of waste in time, effort and motion is a prime factor in modern industry. No device eliminates these factors as completely as LOGAN Air Chucks, LOGAN Cylinders and other LOGAN Air Operated Devices.

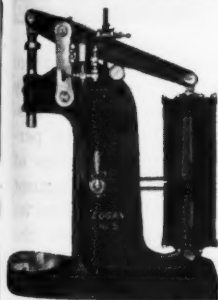
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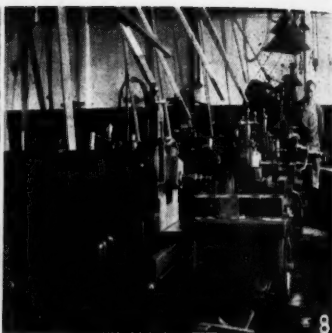
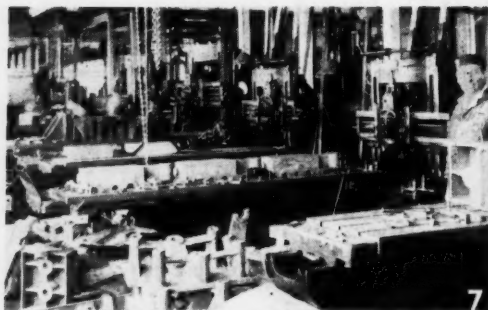
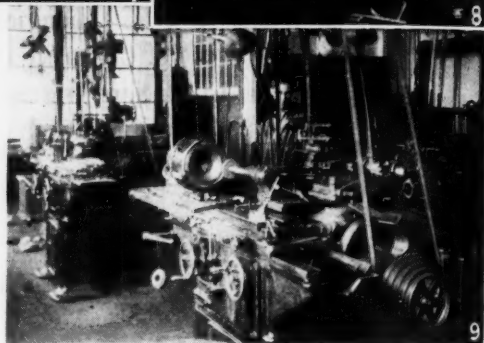


Fig. 7—The standard planing machines are kept busy. Fig. 8—Shapers supplement the planers on smaller work. Fig. 9—A corner of a well equipped grinding department.



the exception of one row in each panel are of holophane glass, which refracts the light in such manner that the entire working floor is flooded with diffused daylight in which no strong shadows are apparent. Aside from the offices and stockrooms, and the fire walls that represent the ends of the several additions, there are no transverse partitions in the shop to interfere with the lighting.

Unlike the old-fashioned special machine shop, the Hartford Special Machinery Company does not manufacture any particular type or style of machine as a regular line, yet its subdivisions are so arranged that all work undertaken by it may be considered to be "manufacturing," whether the order is for a single machine or for a hundred identical machines. Lathes, planers, milling machines, grinding machines, etc., all are grouped, each class in its own department and manned by workmen who are skilled in their particular branch of the trade.

The company builds machines from drawings submitted by customers from

their own designing offices or from "ideas"—perhaps accompanied by crude sketches, perhaps not—of customers who want a machine to perform a given operation or series of operations and have but the vaguest notion as to how the thing is to be worked out. In the first case the engineering office has only to check over the drawings, figure out the estimates and, perhaps, make a few detail drawings to serve the convenience of the shop. When there are no drawings the job begins, of course, in the drafting room, where designs are worked out and complete drawings made.

The illustration, Fig. 1, shows a part of the drafting room, where accommodations are provided for eight draftsmen. In addition to the standard drawing boards the large vertical

# FOSDICK

## 21-inch Heavy Duty Upright Drill

*for all standard drilling jobs*

All-gear drive.

Ground column.

Column braced. Brace encloses drive shaft.

Spindle is high carbon hammered steel forging.

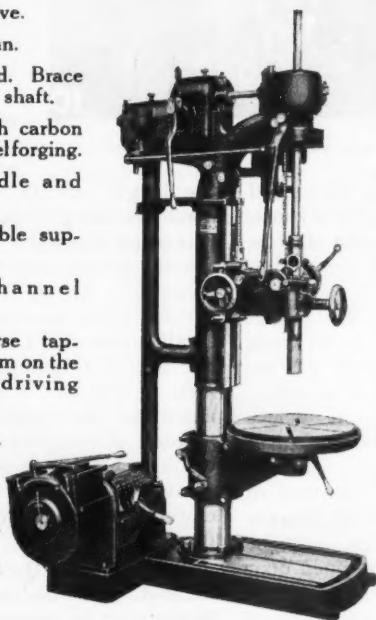
Ground spindle and sleeve.

Extra rigid table support.

Lubricant channel around table.

Friction reverse tapping mechanism on the high speed driving shaft.

Speed box convenient, containing steel gears giving 12 spindle speeds. Five feeds to each revolution of spindle.



Hardened steel bevel gearing to transmit power.

Ball bearing bevel gear thrusts.

Start, stop and reverse friction lever conveniently located.

Worm feed. Worm runs in oil bath.

Duplex feed and quick return.

Power feeds controlled by single lever—can be shifted while drilling

Automatic trip and depth gauge.

Capacity—2½-inch H. S. drill in steel or 3-inch pipe tap in cast iron.

This machine has been especially designed to meet the demand for a high-grade, rigid, accurate, powerful drill for all kinds of standard drilling and tapping jobs. All-gear drive for drilling, and the most powerful friction reverse tapping mechanism known for tapping.

**BUILT IN THREE SIZES—21", 25" and 30".**

*Ask For Specifications*

## THE FOSDICK MACHINE TOOL CO.

CINCINNATI, OHIO, U. S. A.

board to be seen at the left in this view permits full-sized layouts to be made of quite large machines. The

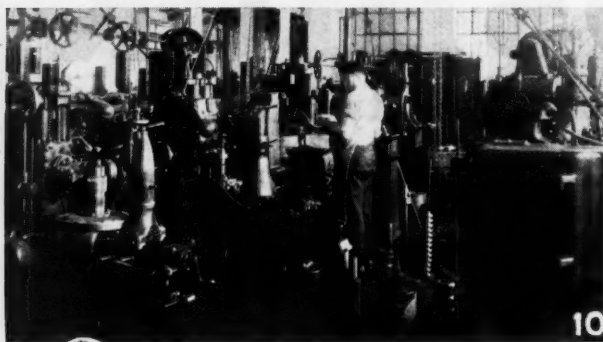


Fig. 10—Gears and cams are made in this department.

board is balanced and may be moved up or down on its supports by a touch of the hand, thus enabling the draftsman to reach any part of the design with ease.

Blueprint files, card indices and similar aids to drafting room work may be seen along one side of the room, and at the rear is a doorway leading to a fireproof vault where original tracings and other valuable papers are amply protected against fire hazard. Through the doorway in the middle of the picture a glimpse of the main business office may be obtained, and beyond it the open door of Mr. Merrit's private room, which is separated from the office by a glazed partition.

Stepping through a doorway in the transverse partition that separates the office from the shop we enter the lathe department, shown in part in Fig. 2, where we find lathes of many kinds and all sizes from the versatile 14-inch toolroom lathe in the immediate foreground to large and heavy machines capable of swinging work 30 inches in diameter. The lathes are

arranged in two double rows, placed back to back for economy of space and extending to the foreman's office, to be seen in the background. The larger machines are served by chain hoists suspended from overhead trolleys, but there are no single parts handled in this department of sufficient weight to warrant the installation of cranes.

Across the broad central aisle which provides a passage way throughout

the length of the shop the milling machines are grouped in a double row extending from the office partition to a point about midway of the original building. These machines are of various types and sizes ranging from small universal toolroom millers to the No. 5 Cincinnati vertical to be seen in Fig. 3. Some of the larger machines are driven by individual motors; others, like the group of Milwaukee machines shown in Fig. 4, derive their power through overhead clutch countershafts from a short lineshaft.

The office of the general foreman, located near the center of the shop, is enclosed by glazed partitions and is elevated about two feet above the general floor level so that the foreman and his assistants are enabled to overlook the entire working space in this part of the building while seated at their desks.

Opposite to the office is a row of Bullard vertical turret lathes, the largest of which, shown in Fig. 5, handles work up to 54 inches diameter.

Two large horizontal boring mills,

## "Atkins Silver Steel Hack Saws — Best for Cutting High-Chromium and High-Carbon Steel"

Says E. W. Gardner, Manager, Modern Tool Company,  
222 Post Square, Cincinnati, Ohio.

"We have found Atkins SILVER STEEL Saws by far the best for cutting the high-chromium and high-carbon steels now used in die-making. We tried all kinds of blades and most of them failed before cutting through one bar. The Atkins Saws sometimes run a month before they need changing."

Atkins blades cut from SIX to THIRTY TIMES  
more metal and cut TWICE AS FAST as  
any ordinary alloy blade manufactured.

CUTS  
6 TO 30  
TIMES  
MORE  
METAL

Investigate, ask us for detailed chart  
showing what can be done and  
the exact cost of doing it in  
your plant. Send now.

CUTS  
TWICE  
AS  
FAST



**E.C. ATKINS & COMPANY**  
402 S. ILLINOIS ST.  
INDIANAPOLIS, IND.

one of which may be seen in Fig. 6, are included in the equipment. Beyond them are the planers, Fig. 7, and the shapers, Fig. 8, while across

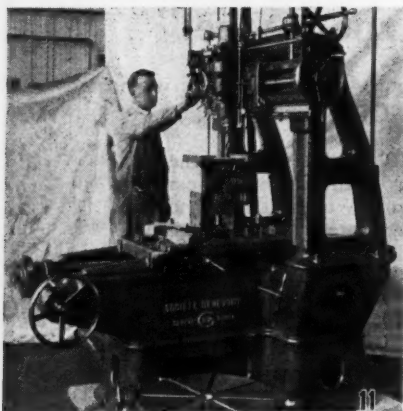


Fig. 11—The jig boring machine performs its operations quickly and accurately.

the room is a grinding department in which are universal and plain cylindrical machines, rotary and reciprocating surface grinders and a vertical-spindle Pratt & Whitney surface grinding machine. The illustra-

tion, Fig. 9, shows only a corner of this department.

Crossing a covered driveway that marks the end of the original shop we come into the assembling department where the larger machines are erected. Though this company builds only special machinery, this does not mean that each order taken by it is for a single machine—indeed, many of the orders are for quantities that but a few years ago would have been considered a satisfactory yearly output for a factory building standard machines.

The most recent addition to the factory is a fully equipped gear cutting department, in which gears, cams and similar machine parts are produced in any required quantity. The equipment includes Fellows gear shapers, Gleason generators, gear cutters, gear hobbors, cam cutting machines and thread milling machines. A part of this department may be seen in Fig. 10. Another recent installation is the jig-boring machine shown in Fig. 11, which enables the company to handle its jig and fixture work expeditiously and with extreme accuracy.

## Keep Last Blanks With Dies

By PAUL A. BARD

UPON completion of the run on a blanking job, the last pieces blanked should be held out and placed with the die. If possible, they should be tied to the die with wire. When tool or diemakers are available, the blanks can then be removed and checked up for dimensions and at the same time the surface can be examined to determine the condition of the die.

In one large shop where the schedules are changed frequently, the practice formerly prevailed of having all dies taken direct from the press

room to the tool room so that they could be given the "once over" before being placed back on the rack. The result was, however, that the tool room soon became badly congested with dies awaiting inspection.

This system was changed so that the die sets are now sent from the press room to the rack and the blanks or punchings, properly tagged for identification, are sent to the tool room. Thus the congestion has been relieved and the diemakers are able to pick up the die sets whenever they are ready to work on them. An examination of the blank or punching will indicate immediately the condition of the cutting edges of the die.

## A Rugged Surface Grinding Machine for the Smaller Jobs

### NORTON COMPANY WORCESTER, MASS.

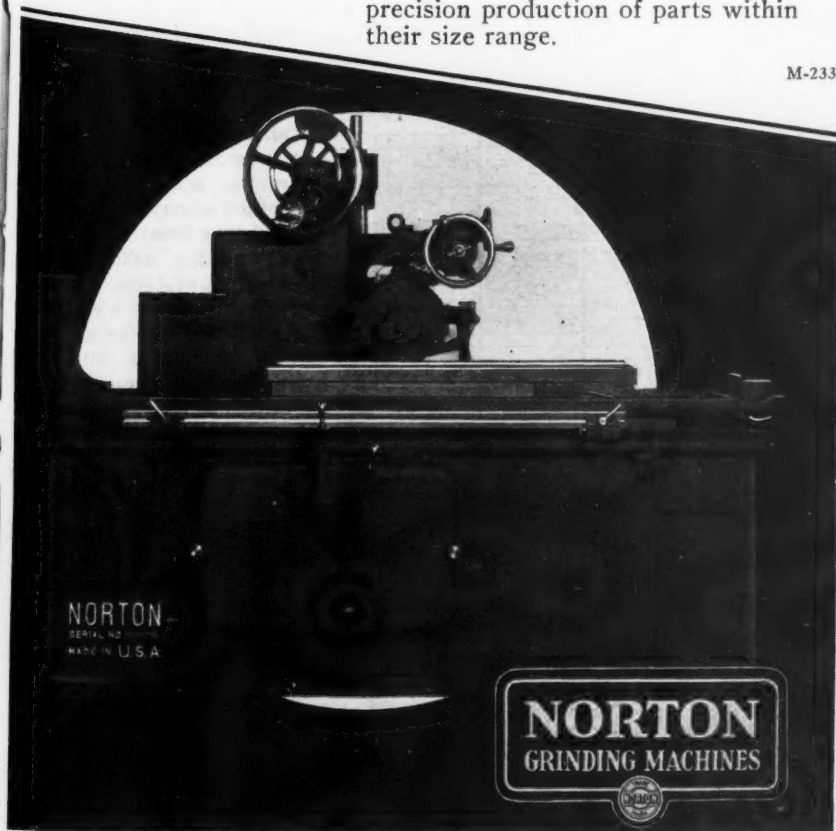
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Norton 6x10x36" and 6x10x48" Hydraulic Surface Grinding Machines are precision machines suited for a broad field of surface grinding operations.

Adaptability for quick change-over fits them to tool room requirements and ability to withstand rapid and continuous operation fits them for precision production of parts within their size range.

M-233



# An Analysis and Classification of Wage Systems

By J. J. BERLINER, B.C.S.  
Senior Member of National Accounting Systems

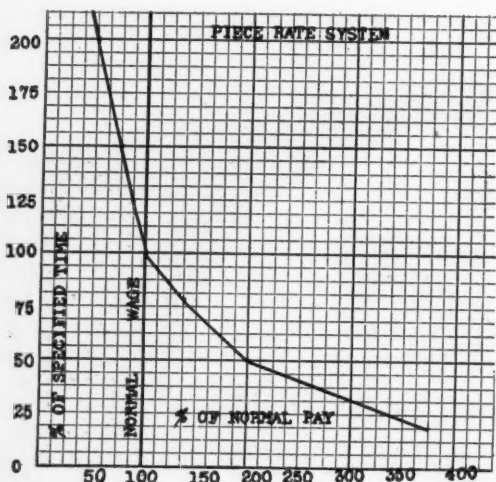
THE problem of wage payment occupies a position of central interest in the industrial world. "How much do you pay?" "What is a fair

is paid by the hour, the week, the month, or the year.

2. Contract work, which includes different payment plans such as (a) the ordinary piece-rate method, (b) the differential piece-rate method (c) the collective contract, whereby a contractor agrees to furnish the labor for a certain quantity of product at a certain price, the contractor selecting his own method of paying those who work for him.

3. Bonus, efficiency, or premium systems, including (a) Promotion systems under day rate as a reward for increased efficiency; (b) the Halsey premium system (c) the Rowan premium system (d) the bonus system; (e) the efficiency system, (f) combination of the above.

**Time Work.** With time work in its usual form, there is no provision for a record of the individual's performance. There is no incentive for effort except of such a sort as will result in the employee's recognition as a good worker by his superior and thus increase his chance for promotion. On the other hand, there is really no penalty for ordinary inefficiency or time-killing. As soon as a reward is introduced for individual



I—Piece rate—Definite rate per piece. Normal pay increases with increased output and decreases with limited output.

day's wage?" These two questions are immediately put by workers on the one side and employers on the other. The question of wages presents one of the most difficult problems to be solved by industry today.

The methods which have been devised for remunerating labor may be classified into three groups as follows:

1. Time work, in which employee

# "SCULLY-JONES" FLOATING REAMER AND TAP HOLDER

For Automatic Screw Machines,  
Turret Lathes, Etc.

**Order  
One On  
Approval**



**S**HORT SHANK TOOLS are recommended for use with this style holder. Collets with standard taper sockets to accommodate "SCULLY-JONES" Tap and Reamer Chucks are advantageous when several sizes of tools are used at intervals.

**Made in Five Standard Sizes and  
Adaptable to Machines and Tools  
with Straight, Taper or Special Shanks**

**T**HE floating action of these Holders permits tools to enter work on a straight line when machine spindle and turret tool holders are off center but in parallel alignment.

Taps produce threads with uniform pitch diameters. Reamers finish holes to size.

*Complete specifications in our Small Tool Catalog No. 36, which describes our complete line of production tools. A valuable handbook for any machine shop.*

## **Scully-Jones & Company**

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**NEW YORK CITY**  
L. C. Biglow & Co., Inc.  
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**West Coast Representative**  
Jos. C. Fletcher  
661 Folsom Ave., San Francisco

**BUFFALO, N. Y.**  
R. C. Neal Company, Inc.  
76 Pearl St.

efficiency, a departure is made from the traditional time work or day rate, even though the reward may be of a sort which is not recognized among the so-called bonus or premium systems of pay.

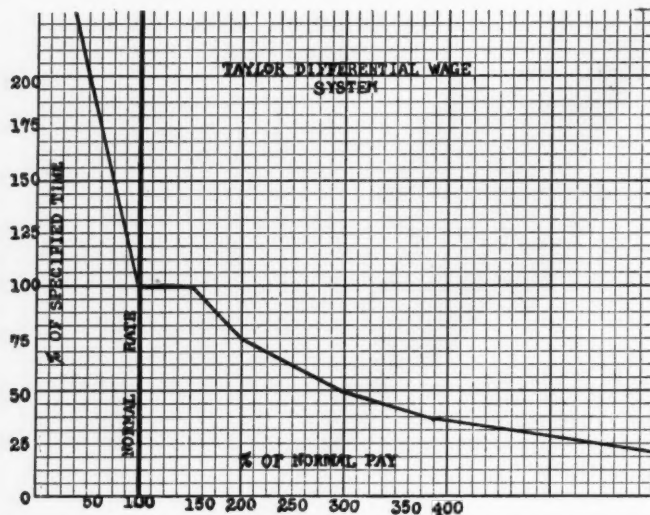
As regards time work: one of the

proper welfare activities, will go a great way toward remedying time losses under a day-rate system. In fact, these conditions are necessary in the introduction of any kind of system.

**Ordinary Piece Rate.** The piece

rate system is the plan of paying for measurable results rather than for time service. At first thought, the ordinary piece rate would seem mathematically fair. The system has, however, been so badly abused that there exists at present a tremendous prejudice against it.

Piece rate has been used



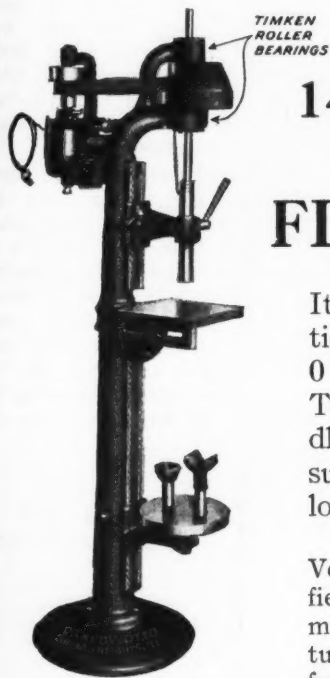
II—Wage increases under differential plan at a more rapid rate as time per piece is reduced.

surest ways of cutting down on the waste or materials and labor is by the introduction of time and motion studies. Time and motion studies, plus standardized routing, scheduling, moving of materials and functional foremanship, will develop economies. But it must be noted that unless the proper inducements are offered to employees for the extra effort necessary to follow the various instructions, and unless penalties are attached for failure to put forth such effort, only a fractional part of the advantages of standardization and planning will be realized. Proper supervision as well as standardization and planning, and good working conditions, such as are developed by

as a bait to speed up employees and then, when the pace was reached at which certain workers would earn more than the management considered they were worth, the rate was cut. After several such cuts the system produces nothing but fear and hostility, together with intentional loafing on all new work so as to get the piece rate set as high as possible, anticipating the inevitable cut. If piece rate is to be used at all, it must be accompanied by a guarantee that there will be no change in rate as long as methods, tools, and machines are not changed. However, where time reduction is accomplished through improved machinery and in no way the result of effort on the

# "Ready For the Job"

—delivery is the first cost-reducing feature of this machine. A square and round table are included as standard equipment on this



## CANEDY-OTTO 14 in. Sliding Head Sensitive FLOOR DRILL

It is a fast, accurate production machine for holes from 0 to  $\frac{1}{2}$ ". Cone pulley runs in Timken Roller Bearings, spindle runs in ball thrust bearing supported by sleeve with extra long bearing.

Vertical motor attachment simplifies power transmission, and eliminates idlers, pulleys, twist and turn belts, reducing power required for efficient operation. The spindle speeds are 400, 850, and 1750 RPM.

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## CANEDY-OTTO MANUFACTURING CO.

General Offices and Factory: CHICAGO HEIGHTS, ILL.

New York Branch:  
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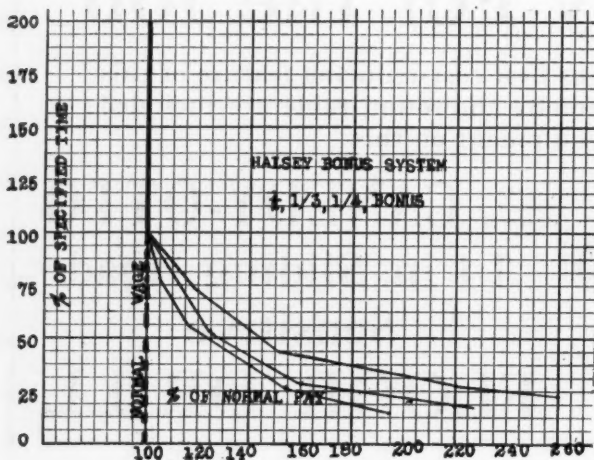
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part of the employee, a change in rate does not constitute a cut. Chart I shows how normal pay increases

pieces. Under the differential piece-rate system there would now be two rates offered, say, for example, 30

cents per piece for output of twenty or less, and 32 cents per piece for an output of more than twenty. Thus if the man produces twenty pieces, his earning for the day would be \$6.00, whereas if he turns out twenty-two pieces, his earnings rise to \$7.04. The company can afford to offer the increased piece rate, because the cost of operating a machine tool, including power, light, heat, rental, repairs, etc.,



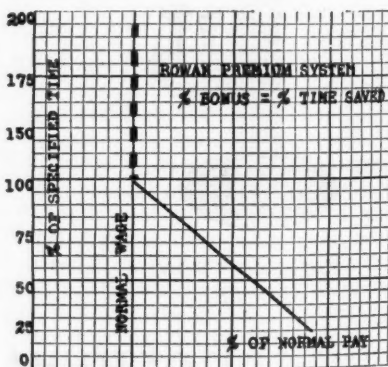
III—Shows pay per piece is not reduced if more than specified time is consumed and pay is increased as time is reduced.

and decreases under ordinary piece rate.

**Differential Piece Rate.** The differential piece rate consists of two rates; (1) the ordinary piece rate, which is paid for normal or ordinary output, and (2) a higher rate, which is paid for more than an ordinary output. Under the differential piece-rate system the workman not only has nothing to fear of the rate being cut, but he has a tremendous incentive to earn a high rate of pay.

For example, assume that, as the result of time study, it is shown that a piece of work can be finished in 15 minutes. In order to allow for necessary rest periods and contingencies, 60 per cent, or 9 minutes, is added to the possible time, making 24 minutes the normal time. In an eight hour day we should have 480 minutes; hence, the normal average output of an ordinary man would be 20

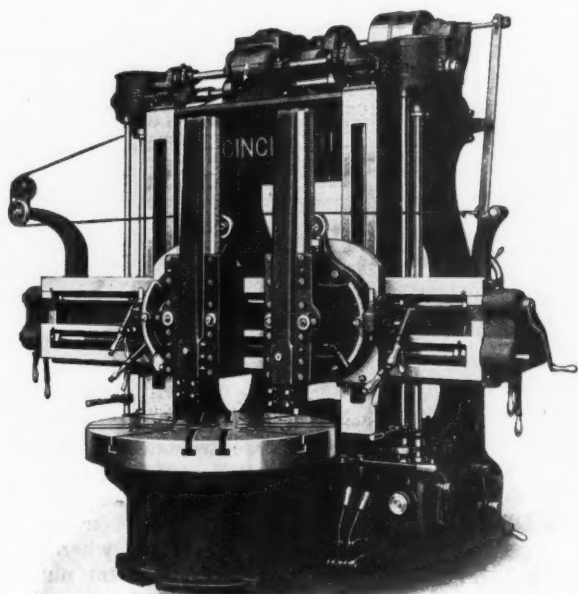
is likely to be as great as the rate of the man who is operating the machine, and the day rate of the ma-



IV—Shows pay remains same if the time is not reduced, but increases if time is reduced.

chine remains very nearly stationary while the output increases. Chart II shows how under the differential

# CINCINNATI BORING MILL



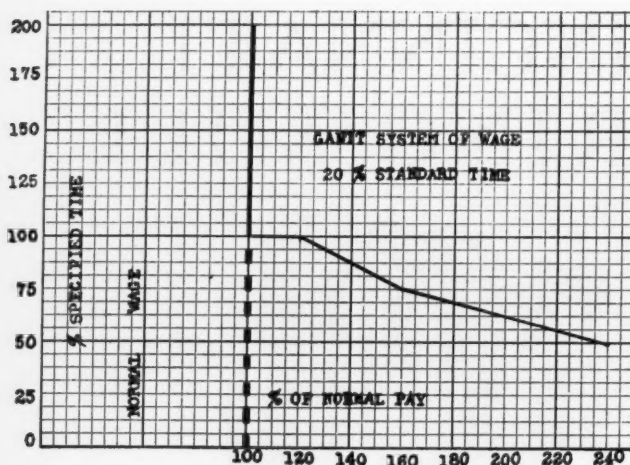
**Rapid Power Traverse**  
**Gravity Lubrication to Spindle and Track**  
**All Steel Gears**  
**Box Arch**  
**Centralized Oiling**

**MADE IN SIZES 5 FT. TO 12 FT.**

**THE CINCINNATI PLANER CO.**

**3100 SOUTH STREET**

**CINCINNATI, OHIO**



V—Shows how under Gantt System, day rate is paid irrespective of output and pay is increased as time is reduced.

piece rate the pay per piece increases at a more rapid rate as time is reduced than under ordinary piece-rate.

This last point may be illustrated mathematically. Let us assume in the above case that the cost of operating the machine is 35 cents an hour.

Machine rate  $\times$  hours + piece rate  $\times$  number of pieces = cost per piece.

Number of pieces

Thus, if a workman turns out only sixteen pieces during an eight hour day, the cost per piece then will be:

$$\frac{35 \times 8 + 30 \times 16}{16} = 47\frac{1}{2}c$$

If, on the other hand, a good workman turns out twenty-two pieces, the cost per piece will be as follows:

$$\frac{35 \times 8 + 32 \times 22}{22} = 44.3c$$

From the above illustrations, it is seen that the workman who produces only sixteen pieces earns \$6.00 per day and the cost to the employer is 47.5 per piece. On the other hand, the workman who produces twenty-two pieces earns \$7.04 per day, while the cost to the employer is only 44.3c. This illustrates the fact that under a

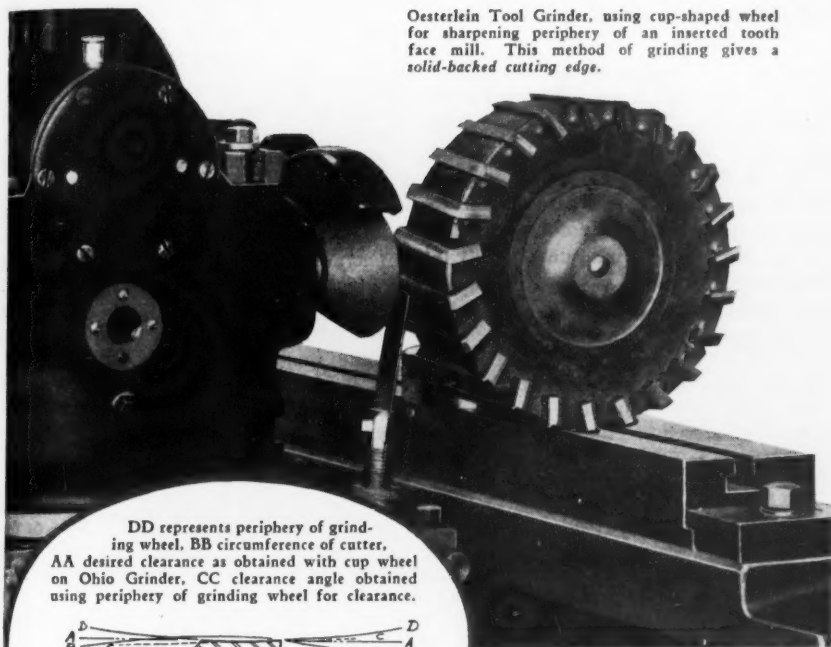
properly adjusted wage system of the differential piece system, both employer and employee may profit.

**Contract work.** Where work is repeated over and over again in considerable volume, the practice exists of making a contract with competent workmen whereby they are to furnish a certain number of pieces at a specified price. Under this arrangement the contractor employs his own men, while the company furnishes the material, buildings, equipment, tools, etc. Perhaps the most satisfactory reason for the employment of contract work seems to be that organized labor will submit to a brisk pace when imposed upon its members by a contractor who is himself a member of the organization.

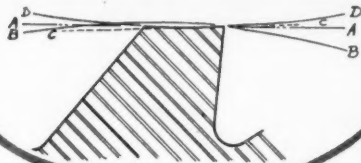
**Halsey Premium System.** In the premium system devised by Mr. F. A. Halsey, the workmen receives his hourly rate, and in addition receives extra pay every time he does the work in less time than the standard time. The time standard originally

(Continued on page 42)

Oesterlein Tool Grinder, using cup-shaped wheel for sharpening periphery of an inserted tooth face mill. This method of grinding gives a solid-backed cutting edge.



DD represents periphery of grinding wheel, BB circumference of cutter, AA desired clearance as obtained with cup wheel on Ohio Grinder, CC clearance angle obtained using periphery of grinding wheel for clearance.



## *Cutters Last Longer When Ground with a Solid-Backed Edge*

**A**N outstanding feature of Oesterlein Grinders is the ease with which a cup shaped wheel can be applied to the grinding of all types of cutting tools. This cup-shaped wheel grinds a straight-line clearance—resulting in a stronger solid-backed cutting edge that has twice the life of any hollow edge.

The sketch above shows the right and wrong way of grinding face mills. The

photograph above shows correct set-up on an Oesterlein Grinder for grinding face mills in a way that means better cutting and longer life.

Write for booklet E . . . a treatise on correct grinding of metal-cutting tools.

**THE OESTERLEIN MACHINE CO., Cincinnati, Ohio**

**OESTERLEIN**  
OHIO  
MILLING  
GRINDING DRILLING  
EQUIPMENT

## An Analysis of Wage Systems

(Continued from page 38)

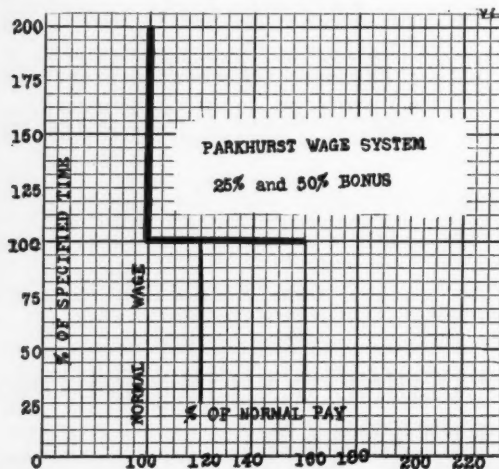
used by Mr. Halsey was the average of the records of previous performance. At the present time, however, the time standard is usually taken from 30 to 60 per cent higher than the time in which a skilled workman can do the work under correct conditions, such time standards having been established by a scientific motion and time study made during demonstrations by a skilled mechanic. The method of figuring wages under the Halsey premium plan is expressed in the following equation: (See also Chart III).

Wages equals time taken x hourly rate x time saved x a fraction of hourly rate.

The usual fraction of the hourly rate is 50 per cent. Prior to the general acceptance and introduction of accurate motion and time study methods as a basis of time standards, various systems were used which sought to establish a diminishing premium scale as the time was reduced below the time standard. These systems sought to provide a sort of insurance for employers who made mistakes in time-setting.

The following table shows some of the results actually obtained under the Halsey Premium Plan:

Time Allowed	Time Taken	Wages at 30c per hour	Premium 1-3 value of time saved	Workmen's earnings per hour	Total labor cost of job
10 hours	10 hours	\$3.00	\$0.00	\$0.30	\$3.00
10 hours	9 hours	2.70	.10	.311	2.80
10 hours	8 hours	2.40	.20	.325	2.60
10 hours	7 hours	2.10	.30	.343	2.40
10 hours	6 hours	1.80	.40	.366	2.20
10 hours	5 hours	1.50	.50	.40	2.00



VI—Shows how, by bonus system, pay on the individual job increases as time is reduced.

The premium rate has the advantage that it does not set up fear as incentive. Absolute guarantee should be made of the principle of time standards under the premium rate systems so long as methods, tools, and machines are not changed.

**Rowan Premium System.** This is a modification of Halsey's premium system as devised by Mr. James Rowan. Time limits are established as under the Halsey System. The amount to be added, in case the time limit is reduced, is figured as follows: The premium equals the money value of the time

# BARNES

## Upright Drills



**Barnes 22½-inch  
four spindle Stationary Head Gang Drill.**

With Stationary Head—15, 20, 22½, 25-in. swing.

With Sliding Head—22, 26, 28, 34, 42, 50-inch swing.

Gang Drills—20 to 26-inch swing.

Barnes Upright Drills are made in a range of sizes from the 50-inch swing, required in the railroad shop, to the 15 and 20-inch sizes used in the small machine repair shop and garage service.

Arranged for Silent Chain or Belted Motor Drive. With or without Power Feed.

*Write for Our Circulars Giving Complete Information*

## W. F. and JOHN BARNES CO.

ROCKFORD, ILLINOIS

Upright Drills                      Screw Presses  
Horizontal and Vertical Production Drilling and Boring Machines

actually taken to do the job multiplied by the time saved and divided by the time limit. For example, if the time limit is ten hours for a piece of work on which is employed a man receiving 30 cents an hour, and he does the work in eight hours, then his pay will be eight times thirty, or \$2.40 for his regular time; the pre-

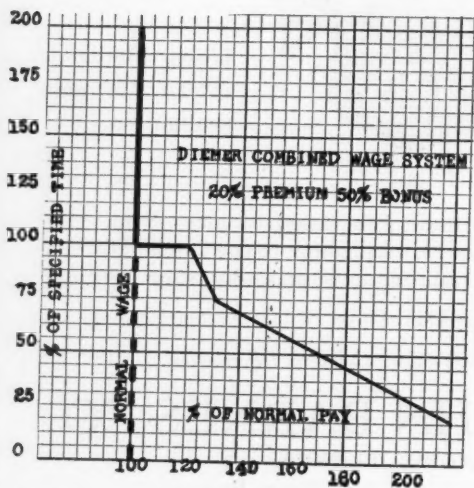
$$2 \times 2.40$$

mium to be added will be  $\frac{10}{10}$   
or 48 cents.

Further results of the application of the Rowan Premium System are shown in the following table. (See also Chart IV.)

Under this system, no matter how far the time is reduced, the premium will never be quite as great as the regular pay at a given time, so that the workman can never double his wages. Some of the objections raised against this system are that it requires a higher grade of clerical help to figure out the premiums than is needed with the Halsey System, also

Time Allowed	Time Taken	Wages on job at 30c per hour	Premium money Value x percent of time saved	Worker's earnings per hour	Total Labor Cost
10 hours	10 hours	\$3.00	\$0.00	\$0.30	\$3.00
10 hours	9 hours	2.70	.27	.33	2.97
10 hours	8 hours	2.40	.48	.36	2.88
10 hours	7 hours	2.10	.63	.39	2.73
10 hours	6 hours	1.80	.72	.42	2.52
10 hours	5 hours	1.50	.75	.45	2.25

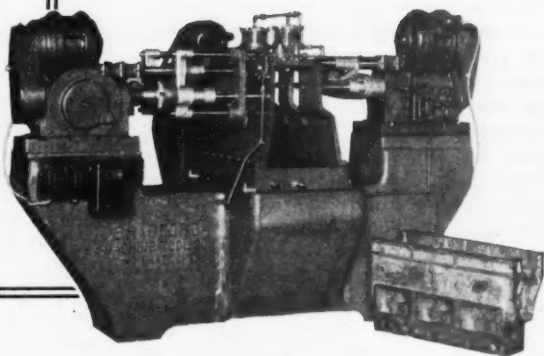


VII—Diemer System. Day rate is guaranteed, but pay increases as time is reduced.

that figuring the premium is too complicated an affair for the workman, and that he will therefore become dissatisfied. Where the clerical labor and workmen are both of a high order of intelligence, these last objections will not hold good. Another objection made is on the ground that there ought to be no limit to the amount of premium or bonus which a man can earn. In reply to this, the statement is made that the management may have a very definite idea of the shortest time in which it is desirable to do a piece of work from consideration of accuracy, wear of machinery, and fatigue affecting the man.

**Gantt Bonus System.** In this system time standards are es-

**SPECIAL  
MACHINES  
FROM  
STANDARD  
UNITS!**



## **Bradford Drilling and Tapping Machines**

consist of one or more Bradford standard unit type heads assembled into one unit and mounted at any angle. Industrial plants throughout the country have increased their production on an amazing range of special production work by the use of these tools.

As an example, an engine manufacturer is using the above machine consisting of

three Bradford unit type heads for reaming seven water jacket holes simultaneously in three sides of a cylinder block. The total time for each block, including handling, is thirty seconds.

Investigate Bradford unit type heads—they will allow you to use standard equipment for special work and get better results.

**Write for Bulletin**

**The Bradford Machine Tool Company**  
659 Evans Street Cincinnati, Ohio

**PRECISION MACHINE TOOL BUILDERS SINCE 1840**

tablished, but the employee is guaranteed a certain hourly rate regardless of his efficiency. If he does the work in the standard time he receives a bonus, usually from 20 per cent to 50 per cent, depending upon the nature of the work. (See Chart V.) If he does the work in less than the standard time he receives the time rate for the standard time plus the same bonus. In other words, the system is virtually a time rate for the man who does the work in more than standard time, and it is a piece rate for those who reach or better the standard.

Suppose, for example, that the standard time for a given job of work is eight hours, the rate of pay is 40 cents per hour, and the bonus is 30 per cent. If the man takes ten hours to do the work he gets ten times 40 cents, or \$4.00 for the job. If he does the work in eight hours, he gets eight times 40 cents, or \$3.20 plus 30 per cent on eight hours is 96 cents. This makes his earnings \$4.16 for eight hours, and his hourly rate is 52 cents. If it takes him six hours to do the work, he receives \$2.40 for the time at work plus 96 cents as a bonus, making his total wage \$3.36 and his hourly wage 56 cents as contrasted to 40 cents in the first instance and 52 cents in the second. In addition to the bonus paid the workmen, a bonus is also frequently paid to the foreman. The foreman's bonus varies with the number of workmen in his gang who earn their bonus, therefore it is larger if all the men in the gang succeed in earning their bonus than if only part of them are successful. For instance, assuming that the foreman had ten men under him, he would get 10 cents per bonus man, or \$1.00 per day, if nine of his men made their bonus. If all his men made their bonus, however,

he would receive 15 cents per man, or \$1.50. This system applies the differential piece rate for rewarding the foreman, and is an inducement for him to secure the highest efficiency from every workman.

It will be noted that the individual job bonus system recognizes one hundred per cent efficiency on the individual job, but does not reward a man for his effort in case he does not attain 100 per cent efficiency. The payment of bonus on individual jobs demands a high grade of accuracy and integrity on the part of the person keeping the time record, so as to prevent the robbing of time from one job and putting it on another in order to favor the working men. Moreover, the most desirable employee is not the one who makes gains by occasional spurts, but one who averages high in efficiency. Under the individual-job bonus system there is no incentive to maintain a uniformly high efficiency on all jobs. Chart VI shows how pay under the individual-job bonus system increases as time is reduced (Parkhurst Wage System).

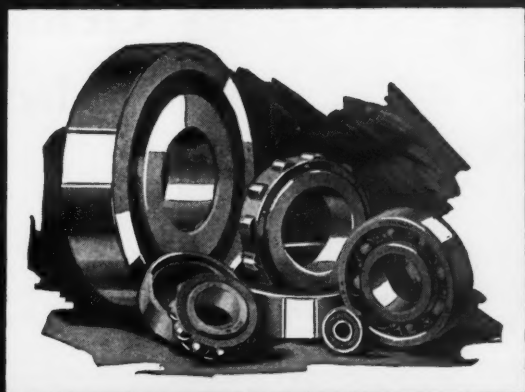
**Diemer Bonus and Premium.** Under this system workmen are paid a percentage increase of their wages if they reduce the time below the past average. They are paid 20 per cent of hourly wage additional if the work is done in a specified standard time, such standard time being based on motion and time study, or demonstration by skilled workmen, and about 30 per cent being added to this time. A further so-called "gain-sharing-bonus" on the Halsey premium plan is allowed if they do the work in less than the specified standard time. In addition to the bonus wage paid, a record is kept of every man's percentage of success during each pay period, and each man's percent-

(Continued on page 58)

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**E**ACH YEAR sees a substantial increase in the number of machinery manufacturers who, building their business upon the performance records of their product, find that the PRECISION distinctive of "NORMA" Ball and "HOFFMANN" Roller Bearings is a large factor in longer machine life, improved performance, greater customer satisfaction.

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**PRECISION**

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The small, inexpensive machine has proved very satisfactory for machine shop use.

## Cleaning Machined Parts

By TOM L. WHEELER, JR.,  
Industrial Washer Division,  
Hobart Manufacturing Co.,  
Troy, Ohio

**C**LEANING operations, particularly on metal parts, have always been unpopular with both the shop executive and the cost accountant, due largely both to the more or less haphazard manner in which such operations were handled, and because they were considered as non-productive expense. With the development of automatic machinery for cleaning such parts, this work is being reduced to efficient, inexpensive mechanical operations which are rapidly being stepped into line with the regular production operations.

While the swing-over from the old open-tank, hand method of cleaning machine shop products has been a rather slow process, the rapid mechanization of other operations has brought to light a need for fast, efficient cleaning methods. As a result, shop executives, with the assistance of cleaning experts, are fast replacing their haphazard cleaning methods with modern cleaning machines that are designed to handle metal parts in

the most feasible manner. In fact, in his haste to install equipment which will bring his cleaning operations up to the efficiency of the rest of the shop, the shop executive often overlooks the fact that while all types of metal-cleaning have fundamentals in common, there are many factors which should be carefully considered in determining the methods to be adopted and the type of equipment to be selected for a given type of work. For this reason, a general understanding of mechanical cleaning methods and equipment is a valuable addition to the modern executive's fund of knowledge.

Unfortunately, in the selection of the cutting, drawing or grinding compounds which are incidental to machining operations, little thought is given to the ease or difficulty with which such substances can be removed from the surface of the metal in order to continue with the finishing operations which customarily follow.

(Continued on page 58)

## Cleaning Machined Parts

(Continued from page 48)

As a consequence, the compounds used are many and various. By this fact, along with the fact that many different metals are machined into shapes and sizes of every description, it can be readily appreciated that cleaning in each shop presents a separate and distinct problem.

To clean thoroughly and economically, and to clean without damage to

the product are the requirements that must be considered when selecting cleaning equipment. In addition to these items such a selection must be guided by these factors:

1.—The kind of oil, grease or foreign matter to be removed.

2.—The composition of the metal to be cleaned.

3.—The shape and size of the pieces to be cleaned.

4.—The operation that follows the cleaning operation.

5.—The maximum temperature to which the heating bath can be heated without harm to the metal.

6.—The quantity that is to be cleaned per day. While one of these items may be the determining factor, each of them will have a bearing on the selection of the methods and equipment to be used.

As an example: The removal of cutting oil from the surface of an intricate shaped steel piece before filing requires only a crude cleaning and demands a machine of radically different design than would be used to remove grinding compound from a piece that was to be painted. In the

latter case, a chemically clean surface would allow oxidation to take place if the parts were to be held in stock long after washing. Thus it can be seen that each case calls for individual study. Years of experience and experimentation on the part of the manufacturers of industrial cleaning equipment have, however, led to the development of a variety of equipment which makes it possible

for the prospective user to obtain a standard machine for practically any cleaning operation.

While the designs of most types of machines that are on the market at the present time involve the use of the one major principle of mechanically throwing the cleaning solution, they differ largely, of course, in general design. The solution

is agitated or thrown over the work either by revolving wash arms, by a series of stationary spray pipes, or by a series of mechanically-operated paddles. Where the revolving wash arms or spray pipes are employed, the solution is drawn from the tank and forced through large spray nozzles by means of an electrically-driven centrifugal pump. In the majority of cases the "spray" method of cleaning has been found most satisfactory as the solution being forced from the spray nozzles sets up a stripping, slicing, or cutting action that cannot be obtained when the solution is thrown in a mass over the work.

When a cleaning agent is used which must be applied as a hot solu-



Dental burrs—a sample of the very small work that can be thoroughly cleaned of all foreign matter by one of the small single-unit machines. The mesh of the basket must be fine enough to meet the particular requirements.

tion (this includes the majority of commercial cleaning compounds), the tank may be heated by gas, steam injectors, or steam coils, depending upon the facilities afforded by the shop. In order to maintain the cleaning qualities of the solution and thus eliminate the necessity for frequent



(Left) — The rotary drum machine easily removes oil and chips from large quantities of intricate-shaped parts. (Below) — Small machined parts are handled in wire baskets and are pushed from the slide onto the flight bar conveyor which automatically carries them through the machine.

changes, a device is employed which automatically removes the oils and greases that rise to the surface of the solution. The heavier wastes are removed by a series of baffles and strainers through which the solution passes as it is drawn from the bottom of the tank by the pump.

The removal of greases and foreign matter from the cleaning solution is only one of the outstanding advantages of the spray type of washing over the tank method. In removing parts from the ordinary tank, such parts must of necessity pass through the collection of oils and greases that rise to the top of the solution, with the result that they emerge covered with a film of grease and are, therefore, far from being clean.

Washing machines may, in general, be divided into two classes; the flat conveyor type and the rotary drum

type. While the flat conveyor machines are most commonly used, both types are satisfactory for the particular classes of work for which they have been designed. The flat conveyor type of machine may be either automatic or semi-automatic. In using the semi-automatic, the



work is placed in wire racks or baskets or directly on a slide conveyor upon which it is pushed by hand through the wash zone, where the solution is discharged over the work both from above and below. The work emerges thoroughly cleaned. This type of machine offers an outstanding advantage in that the wash period may be lengthened or shortened depending upon the particular work being processed. Where speed of production is of major importance, however, the automatic machine is found much more satisfactory.

## A good investment even for small production



**B**IG production is not a prerequisite for the justification of a Hutto Cylinder Grinder.

Many shops with only a limited number of bores to be ground in a day or week have found it pays to use Hutto equipment.

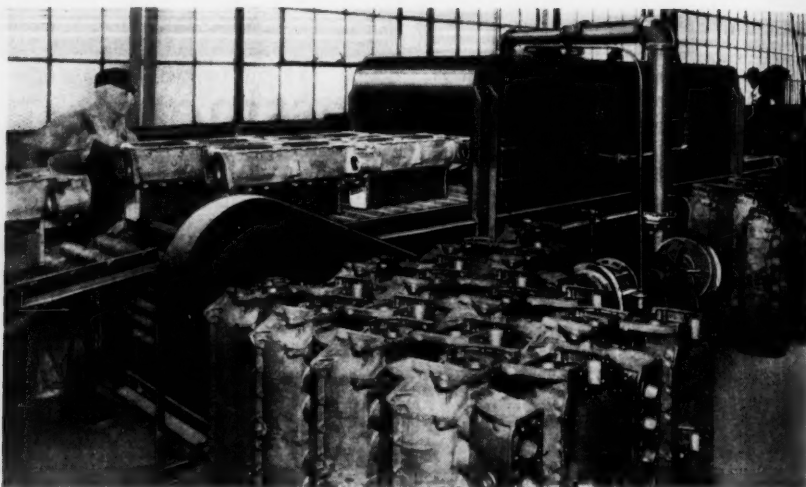
You will be agreeably surprised to find how little it will cost to install a Hutto Grinder designed to meet your requirements.

Furthermore, a careful check will show that Hutto equipment insures greater speed and accuracy at a much lower operating cost.

It does not make any difference how big the cylinders are because there is a Hutto for every bore ( $\frac{3}{4}$ " three-fourths of an inch or larger in diameter and any length.

Tell us your grinding problems and we will gladly make a recommendation.

**HUTTO ENGINEERING COMPANY, Inc.**  
542 LYCASTE AVENUE  
DETROIT, MICHIGAN



Where oil and chips are to be removed from large parts, a single wash unit, equipped with an automatic conveyor, does the trick in seconds where formerly minutes were required.

The method of handling work in the automatic machine is similar to that used with the semi-automatic machine, with the exception that a mechanically-driven conveyor is used. Where the kind of work in process is changed frequently, necessitating changes in the length of the washing periods, a variable-speed control is employed which not only offers all the advantages of the semi-automatic machine but also handles the work on a production basis.

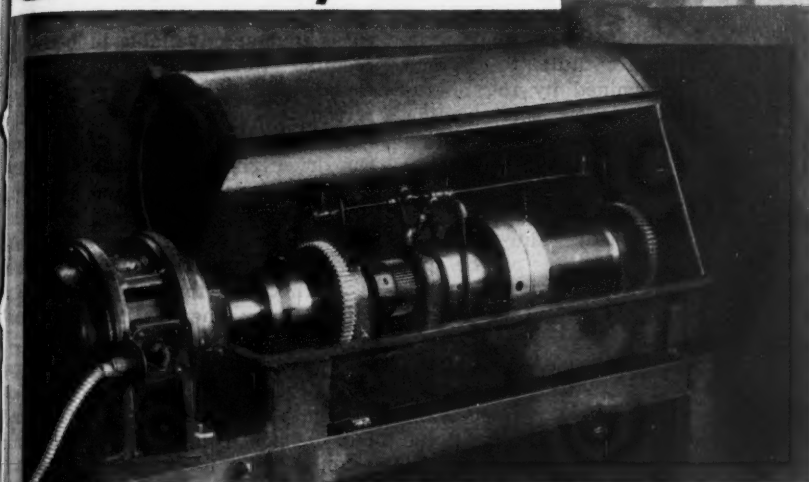
The types of conveyors which may be used include the wire mesh, link mesh, malleable link and flight bar. The flexibility of these conveyors as to mesh opening or spacing, as well as to the difference in the meshes which may be used in racks, makes it possible to handle with ease parts ranging in size from small dental burrs to large automobile chassis. The flat conveyor machines are of exceptional value for cleaning large parts, or where the products to be cleaned are of various sizes and

shapes, also where any possibility of marring the surface of the metal would be an objection.

The rotary drum machine may be considered as a combination of washing machine and tumbling barrel. In this unit a large drum, capable of revolving, is placed in the wash tank and the work is either shoveled or poured into the drum. A spiral flight conveyor then carries the work through a wall of washing solution which is discharged from a stationary spray pipe.

Two things are accomplished by handling the work in this manner: first, the parts are burnished by the tumbling, and second, the position of each part is being changed continually, thus allowing the sprays to reach every part of the surface, no matter how intricate the shape of the part may be. Rotary drum machines are used mostly where a large quantity of small parts is to be cleaned and where marring such parts will not be objectionable.

# Gruelling Tests\_



## on FORMICA Gears

THIS is a gear testing machine operating in the laboratories of the Formica Insulation Company. On it gears are given tests for strength and durability.

They receive treatment which in a short period is equivalent to months of ordinary use.

Steady effort for 15 years has effected constant improvement in Formica gears. Different formulas and methods of making are constantly under trial.

Formica makes new machinery easier to sell because it is quiet. Maintenance men like it because quiet machinery sounds well maintained.

**THE FORMICA INSULATION COMPANY**

4640 SPRING GROVE AVENUE

CINCINNATI, OHIO

# FORMICA

Either the flat conveyor or rotary drum type of machine may consist of one or all of three units: (1) a wash unit containing the washing solution, (2) a rinse unit containing clean hot water, (3) a drying unit. The combination of units to be used is largely determined by the operation that is to follow the cleaning process. For instance, if it is desired to remove oil and grease from steel parts prior to inspection or storing, a single wash unit is generally used because the unnoticeable film of cleaning solution that remains on the surface of the work prevents the oxidation that would take place if the work were chemically clean.

Should these same steel parts be plated immediately after cleaning, a wash and rinse would be necessary first in order to chemically clean the surface, as the slightest film of foreign matter would interfere with the plating. If the parts were to be enameled or painted after cleaning, a three-unit machine, consisting of the wash unit, rinse and dryer should be employed to insure a perfect finish. Such a machine would eliminate all water spots, which are usually the

cause of the peeling of paint or enamel.

The speed with which mechanical cleaning has developed is evidenced by the many small and additional features that are available to better the results. For instance, it has been found that in the cleaning of non-ferrous metals, a quick cold water rinse between the hot water rinse and the dryer greatly facilitates the drying of the work. In some cases, the use of a blower entirely eliminates the need for a drying unit by sufficiently blowing the surplus solution from the work to allow the pieces to air-dry from the heat absorbed during the rinse period.

Numerous cases illustrating special uses and adaptation of mechanical cleaning equipment could be outlined, but the best course, when a cleaning problem is to be solved, is to call in the cleaning specialist. Through his recommendations it may be possible to greatly reduce the expense of cleaning operation, or he may be able to simplify a cleaning problem which appears impossible to the man whose knowledge of modern cleaning processes is more limited.

## Analysis of Wage Systems

*(Continued from page 46)*

age of success is made the basis of increase in his hourly rate. (See Chart VII.)

**Selecting a Wage System.** In conclusion, it must be noted that the type of wage system to be introduced will depend not only on the extent of standardization, but also on whether the workmen are of a high or low grade of intelligence, and whether or not they are under the domination of strict union regulations in regard to wages. In general, we may state the field of the various systems as follows:

Where standardization has not

been developed very far, time work with efficiency records is appropriate.

Where standardization is under way, but has not been very well developed, the premium system is applicable.

Where standardization is fully developed, the bonus system on individual jobs, the combined bonus and premium system, or the efficiency system can be used.

I have never seen a man who could do real work except under the stimulus of encouragement and enthusiasm and the approval of the people for whom he was working.

—CHARLES M. SCHWAB.

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## Cutting Set-Up Time In Half

### McCrosky Self-Centering Steadyrest



**T**URNING and threading valve stems—that's the engine lathe job shown above. Instead of an old-style steadyrest a McCrosky Self-Centering Steadyrest is mounted on the lathe. By use of this attachment the set-up time is reduced by one-half. Here's how:

When the work is in place on centers, all the operator has to do is to close the jaws until the three interacting rollers engage the work. A turn of the tightening screw, and he is ready to begin. All the fuss of cutting and trying with the old-style rest is eliminated. The freely turning rollers create no friction to consume extra power, and they do not mar the work.

The McCrosky Steadyrest handles any diameter from  $\frac{3}{8}$ " to  $3\frac{3}{4}$ ". It speeds up all operations performed on the end of a piece. A surplus lathe equipped with a McCrosky rest makes an economical centering machine. *Bulletin No. 11-C* tells the whole story. Send for a copy.

# McCROSKY TOOL CORPORATION

MEADVILLE

[ Branches in Cleveland, Detroit,  
Chicago, Toronto ]

PENNSYLVANIA

# Linestart Motors Require Wider Pulleys and Belts

By J. R. HOPKINS  
Chicago Belting Company

**D**URING the development of the linestart motors or "across the line" motors the motor manufacturers have apparently been so engrossed with the purely electrical problems that they have overlooked the need of wider belts on account of the increased starting load imposed upon them, due to the higher starting torques of these motors. This is shown by the fact that, in spite of these higher starting loads, these manufacturers are equipping their linestart motors with pulleys of the same width as those used on standard motors. When questioned on this point their answer has been that the effect of the higher starting loads is but momentary and not enough to affect the belt. However, in actual shop practice it has been found that when a linestart motor is started, the pulley will frequently spin around inside of the belt—not for a moment or two—but for from thirty seconds to three minutes.

Linestart motors are those that start "across the line." The current goes directly to the motor, the inrush of current being controlled by the motor itself. These motors come from rest to full load very quickly, and have a high starting torque. As no compensators are used, they impose upon the belts an increased overload which cannot be controlled by the operator. Standard motors, on the other hand, use starting compensators which control the flow of current, thus giving the operator some means of control-

ling the overload on the belt. Linestart motors are made in two types, one type being the normal load linestart motor, and the other, the high torque linestart motor. As compared to standard motors, the linestart motors have a much higher starting torque and higher overloads at the shaft. The standard motor has an overload in starting of 112 per cent at the shaft while the normal load linestart motor has an overload in starting of 150 per cent at the shaft. The high torque linestart motor has a maximum torque in starting ranging between 2.38 times full load to 3.00 times full load. These higher starting loads mean 200 to 300 per cent overload on the belt, therefore a pulley that is too narrow to afford the necessary contact with the belt will spin inside the belt. This spinning will either burn the belt or drive it off the pulley.

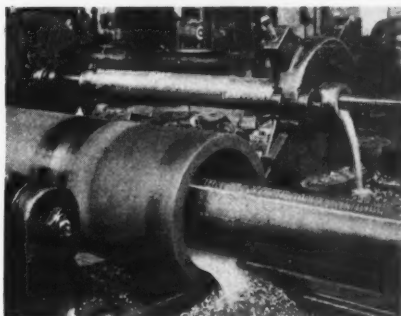
At a meeting of the Electrical Maintenance Engineers in Chicago, it was agreed that wider pulleys and belts would overcome this trouble. Tests have shown that the normal load linestart motor requires a belt from 20 per cent to 25 per cent wider than is required for use on a standard motor. In other words, if the belt used on a standard motor is 4 inches wide, a linestart motor of the same size would require a 5-inch belt. This applies to motors 7½ h. p. and up. The high torque motors require pulleys and belts 50 per cent wider than

(Continued on page 84)

# at a Lowered Cost for Manufacturers

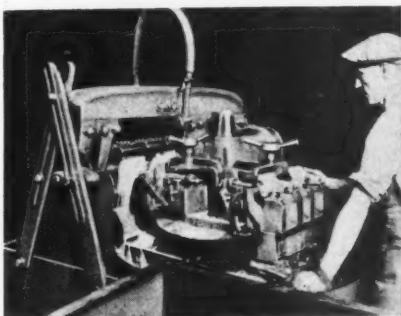
**THESE prominent Machine Tool Manufacturers use Sunoco Emulsifying Cutting Oil.**

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Abrasive Machine Tool Co.  
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Cincinnati Milling Machine Co.  
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COURTESY OF CAMDEN FORGE CO., CAMDEN, N. J.

**MACHINE:** BRIDGEFORD BORING LATHE, 80-FOOT TABLE.  
**OPERATION:** DRILLING HYDRAULIC CYLINDER FOR STEERING GEAR.  
**MATERIAL:** 25 TO 35 CARBON STEEL.  
**DEPTH OF DRILL:** 20 FEET.  
**DIAMETER OF DRILL:** 14 INCHES.  
**TIME:** 120 HOURS.  
**CUTTING LUBRICANT:** 1 PART SUNOCO EMULSIFYING CUTTING OIL TO 16 PARTS WATER AT 125 LBS. PRESSURE.



COURTESY OF CINCINNATI MILLING MACHINE CO., CINCINNATI, OHIO

**MACHINE:** 4-36 PLAIN CINCINNATI HYDRAMATIC.  
**OPERATION:** MILL FACES OF 3 BOSSES AND FLASH AT BOTTOM.  
**MATERIAL:** STEEL FORGING.  
**CUTTING LUBRICANT:** 1 PART SUNOCO EMULSIFYING CUTTING OIL TO 20 PARTS WATER.

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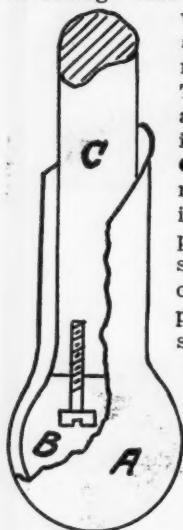
## Ideas From Readers

*This department is a clearing-house for ideas. If there is a "kink" or short-cut in use in your shop, send in a description of it. We will pay \$5 for each one published.*

### Using Rubber to Bulge Tubing

By CHARLES KUGLER

**O**CCASIONALLY a job calls for a bulge to be formed in a section of tubing. The bulge can be formed



Using rubber to bulge tubing.

very simply with the aid of a section of round but soft rubber. The drawing shows a piece of tubing **A**, in which is the punch **C** and the section of rubber **B**. The rubber is attached to the punch with screws as shown. As the punch comes down, it compresses the rubber, spreading it and forming the bulge. When the punch is withdrawn, the rubber assumes its normal shape and is easily removed from the tubing. A bulge can be formed at any point in a section of tubing by inserting a rod to the spot, then inserting the section of rubber at the other end and compressing the rubber between the two rods.

### Grouting the Bedplate

By M. J. KUNERT

**I**N the grouting of large plates and bed castings it is customary to

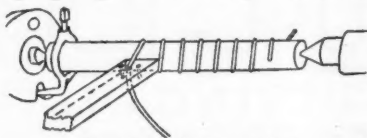
level the plate with iron wedges and then pour the grouting under the plate, trusting to luck that the grouting will run under the entire surface and thus form a firm foundation.

We have eliminated the doubt by using the following method. We make jack screws out of four small machine bolts by grinding the ends to a point, then we drill and tap four holes through the bedplate and screw the bolts in. After the plate has been leveled on the usual flat iron blocks, the plate is raised by screwing the jackscrews down onto the blocks, the grouting is poured, and the plate is lowered to its original position on the blocks. About half an inch more grouting is poured than is required so as to make sure that a solid foundation will be formed. Any excess grouting will ooze out as the plate is lowered into place. The jack screws can be removed by screwing them out or by chipping them off.

### Tool for Winding Springs

By H. L. WHEELER

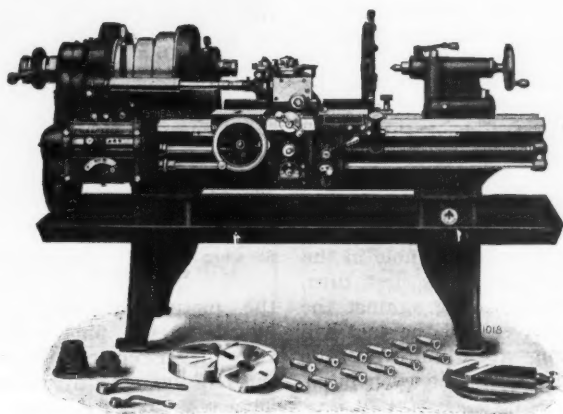
**T**HE simple little tool shown in the drawing cannot be beat for winding springs in a hurry. With this



Tool for winding springs.

tool it is possible to wind a spring accurately without the necessity of gearing the lathe to obtain the cor-

# Le Blond Tool Room Lathes



Le Blond 15" Cone Driven Precision Tool Room Lathes

Le Blond precision tool room lathes are offered for the most exacting requirements with any or all of the attachments required for tool room work. They are built to the highest standards of accuracy and precision.

**The R. K. Le Blond Machine Tool Co.**  
Cincinnati, Ohio

rect pitch. The tool is made of  $\frac{1}{4} \times 1$ -inch cold rolled steel, drilled as shown in the illustration. A slight bevel is filed on the right or left hand side, depending upon whether a right or left hand spring is required. The pitch of the spring is regulated by the distance from the center of the wire hole to the side of the beveled edge.

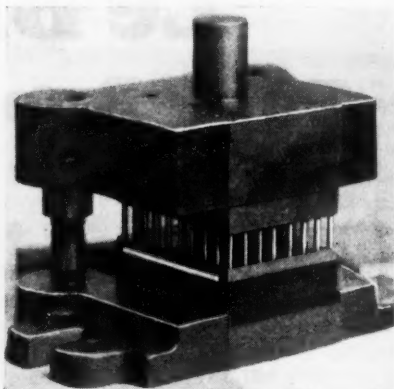
The hole should be drilled somewhat larger than the diameter of the wire, and three or four holes may be drilled in the piece at various intervals so that several pitches may be wound with the same tool. Both sides may be beveled if desired, thus making the tool adaptable for either right or left hand coils. In use, the holder is held in the left hand with the wire passing through the hole in the tool and then through the hole in the arbor. After making the first turn, the holder will pull snug against the arbor as it revolves and the tool will be forced along at a uniform rate, thus giving the spring an even pitch.

## Punch Press Guard

By R. N. KIRCHER

**A**N UNUSUAL type of punch press guard, in use in our plant, is shown in the illustrations herewith. The die is of the progressive type and is used for blanking small washers, the stock being fed through the

narrow horizontal slot between the plate in which the pins are mounted and the die proper. When the die is in operation, it appears as shown in



Showing die as it appears when in operation, with guard pins engaged.

the picture of the assembly, the length of the pins being such that they never entirely leave the holes until disengaged by raising the ram. The pins are too close together to allow fingers to be inserted.

## Preventing Corrosion of Steel Parts

By C. A. WERNER

**S**SMALL, finely-finished steel parts, even when handled with the utmost care, have a way of rusting which often necessitates the trouble and cost of refinishing or scrapping the parts altogether. Contrary to general opinion, it is quite possible for oxidation to occur from the interior as well as from the exterior of steel parts, particularly where the



The pins can be of any required length, with holes of corresponding depth.

## ECLIPSE MULTI-DIAMETER CUTTERS

—hundreds of them—are saving thousands of dollars for their users. The cutter illustrated eliminated several operations, five cutters, one operator, and cut production time in half.

Sales Representatives in all large cities.



Catalog No. 28 Upon Request.

Pat. RE-16817

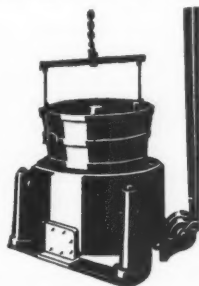
We will show you how to reduce operation costs—send us a blue print TODAY.

**ECLIPSE INTERCHANGEABLE COUNTERBORE COMPANY**  
DETROIT — MICHIGAN

## TOLHURST

### Chip Wringers save the oil and save in labor and expense

One Reclaiming Department had ten small (one and two bushels) machines. They installed one 48" and a 40" Tolhurst, replacing all small machines and eliminating eight operators.



WRITE FOR CATALOG

**TOLHURST MACHINE WORKS, Inc., Troy, N. Y.**

New York Office: 30 Church Street  
Chicago Office: 8 So. Dearborn St.

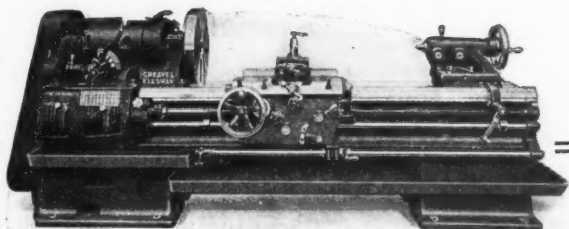
## JUST 1 LEVER TO CONTROL G. K. SPEEDS

G. K. single lever control means that it is only necessary to move one lever to obtain the desired spindle speed. In an instant the speed can be changed as the operator has to reach for only one lever instead of hunting for a combi-

nation of levers. Minutes thus saved lower production costs. There are many other features built into G. K. lathes that help to reduce operating costs. They are fully described in the G.K. Catalog. May we send you a copy?

**The GREAVES-KLUSMAN TOOL CO., Cincinnati, O.**

**Flexible  
Motor  
Drive**



**Built  
In Six  
Sizes**

surface of the steel is relatively porous when the steel is quenched. If brine is used as a quenching medium, the solution enters the minute pores in the metal and oxidation immediately begins. Of course, this situation can be remedied to a certain extent by flushing thoroughly.

One large company, which manufactures several kinds of small, highly-finished steel parts, has overcome the difficulty by giving the parts a five-minute bath in oil at 50 degrees Centigrade. They are then carefully wrapped in high grade wax paper before being put into stock. Past experience has shown, however, that the use of an impervious wax paper is not sufficient to prevent surface corrosion or oxidation. The choice of paper is extremely important, as some papers are hygroscopic. Having determined that the paper selected is impervious to moisture and provides an impregnable barrier to oxidation, each part is further sealed in its wrapper by heating after wrapping so that the wax will flow and fill any cracks or spots in the paper which were not sealed before.

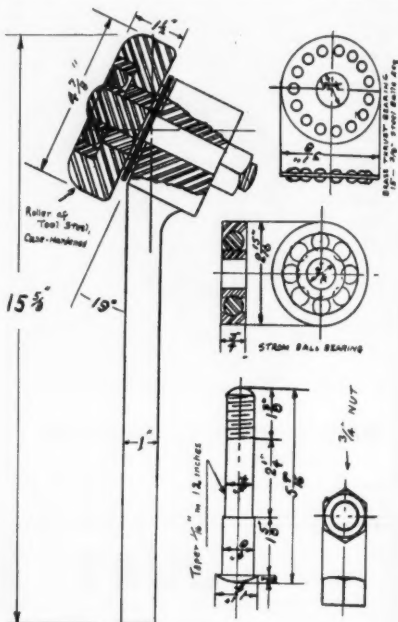
The heating is done with an electric heater of the domestic type with a rating of about 500 watts. On top of the heater is placed a discarded die shoe approximately one inch thick. When the shoe is hot each piece is wrapped in the wax paper and is then rolled over the hot shoe. The wax melts and seals the wrapper. As the parts have been previously boiled in oil, they can be stored indefinitely without corrosion.

## A Ball-Bearing Journal Roller

By H. H. HENSON

IN some of the older railway shops, where the external grinder has

not yet found its way, the journal roller shown in the drawing may be of interest. The roller is made of tool steel, case hardened, and is fitted with both a Strom ball bearing and



Ball-bearing journal roller.

a 15-ball thrust bearing. Having a radius which conforms to the fillets on the journal bearings, the tool is also used as a burnisher and does away with the filing and polishing of the fillets. The tool can be constructed at a very nominal cost and will produce a fine finish on the work.

### CO-OPERATION PAYS !

The firms whose advertisements are found in this magazine are live, progressive leaders in the metal-working industry. If you need tools or equipment buy from the leaders; patronize those who are represented in these pages—and mention MODERN MACHINE SHOP. You will benefit by it.

**MAIL THIS**  
**TO SOLVE YOUR CLUTCH PROBLEMS**



[Furnished in Double  
Type As Illustrated  
or Single.]

**Rockford Drilling Machine Co.**  
 Rockford, Illinois

*If This New*

**PULLMORE Industrial Clutch**

**MAKES POSSIBLE:** { **Extreme Compactness**  
**Greater Clutch Efficiency**  
**Fewer Adjustments**  
**Ready Adaptability**

**MAIL US DETAILS**

Name .....

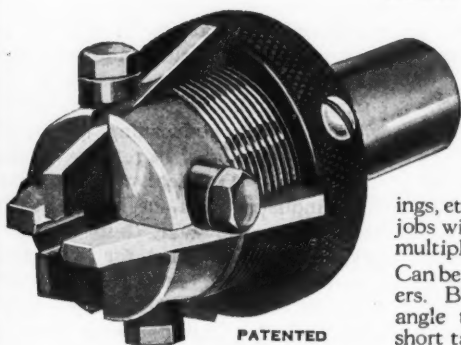
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**Genesee Adjustable Hollow Mill**

**Made in 7 different styles**



**PATENTED**

Has adjustable, replaceable blades and can be replaced at nominal cost, making it unnecessary to continually buy new tools.

The ideal tool for finishing your forgings, castings, etc. Do your several operation jobs with Genesee inserted blades multiple operation tools.

Can be fitted with drills and reamers. Blades can be ground any angle to point work and turn short tapers.

**A Genesee Adjustable Hollow Mill can be made for every job**

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**GENESEE MANUFACTURING CO., Inc.**

**ROCHESTER, NEW YORK**

# MODERN MachineShop

HOWARD CAMPBELL - - Editor

## Aviation and Opportunity

**T**HE speed with which the aircraft industry of this country is gathering momentum can hardly be realized. Airplane factories with capacities of 100 or more planes per month are far behind on their shipments, and the shortage of trained mechanics is becoming acute.

New aircraft companies are constantly in process of formation, new plants are continually under construction, and additions are being built onto those which are in operation. A large number of cities and towns throughout the country are providing airports which will be equipped with all the latest machinery, tools and facilities, including waiting rooms for passengers. The demand for shop equipment for airplane and motor plants is having a marked effect upon production schedules in machine tool plants, as evidenced by the fact that one large manufacturer of milling machines has been forced to purchase an adjoining plant in order to provide for the necessary increase in manufacturing space.

Although already a large industry, the manufacture of airplanes is still in its infancy. Both men and machines will be requisitioned in large and increasing numbers in the near future, and the opportunities which are now opening every day are greater—both in numbers and in possibilities for the future—than they have been since the automobile indus-

try stepped out of its swaddling clothes.

## Business Conditions

**T**HE record-breaking pace of American industry and trade has been maintained to the close of the first half of the year. A large number of the major industries have set new high production records, and the output of pig iron, steel, automobiles and auto trucks, airplanes, motor boats, tires, gasoline and oil, farm implements, machine tools, electrical machinery, textiles, flour, and other products has surpassed the corresponding period of any previous year.

Banking and credit conditions have improved steadily, and all indications are that this situation will remain unchanged through the remaining months of 1929.

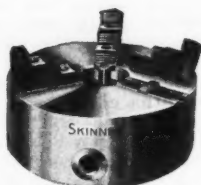
The new agreement on German reparations should have a stabilizing effect upon the economic conditions of all the leading nations. As these countries work back toward the normal levels of production and consumption, the natural result will be an increase in world trade, of which the United States appears to be securing its full share. The optimism which prevails concerning the future of world prosperity is reflected in the revival of American shipbuilding. This industry has been practically dead since the war, but contracts have now been signed for more than a score of large, fast vessels which will cost from \$6,000,000 to \$8,000,000 each and the United States Lines is contemplating the construction of two liners to cost around \$25,000,000 each. Such a program will create a demand for labor and materials which will involve many other industries.

# SKINNER

## Universal Geared Scroll CHUCKS



Figure 3500-3900  
with Two Piece  
Reversible Jaws



Style "T" Jaw

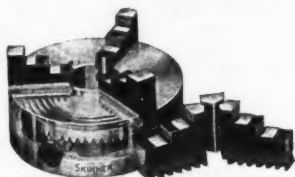


Figure 3400-3800 with Two Sets of  
Jaws, Style No. 1 and No. 2

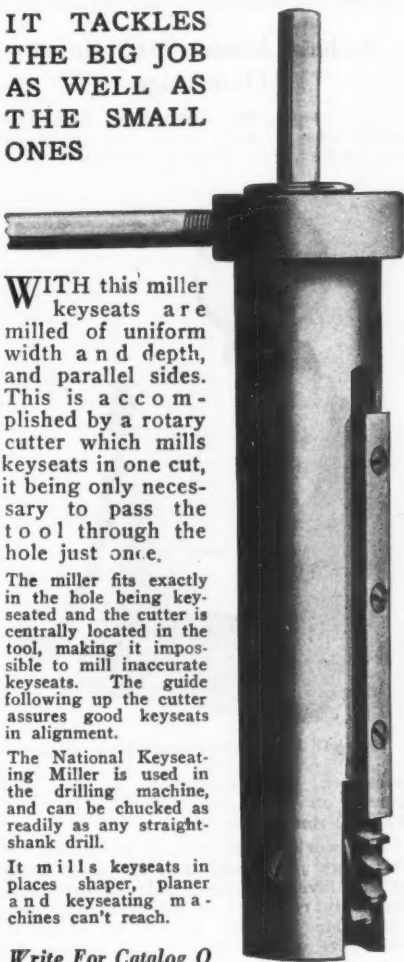
IRON BODY				STEEL BODY			
Figure 3400 Three Jaw				Fig. 3800 Three Jaw			
Figure 3500 Three Jaw				Fig. 3900 Three Jaw			
Rated Size Inches	Order by These Numbers		List Price		Order by These Numbers		List Price
	2 Sets of Jaws	2 Pe. "T" Jaw			2 Sets of Jaws	2 Pe. "T" Jaw	
3	3403	3503	\$29.00		3803	3903	\$40.00
4	3404	3504	33.00		3804	3904	44.00
5	3405	3505	36.00		3805	3905	49.00
6	3406	3506	41.00		3806	3906	59.00
7½	3407	3507	48.00		3807	3907	69.00
9	3409	3509	57.00		3809	3909	85.00
10½	3410	3510	64.00		3810	3910	93.00
12	3412	3512	75.00		3812	3912	112.00
15	3415	3515	107.00		3815	3915	149.00
18	3418	3518	140.00		3818	3918	200.00

THE SKINNER CHUCK COMPANY

NEW BRITAIN, CONN. U. S. A.

# A LIVE WIRE KEYSEATER

IT TACKLES  
THE BIG JOB  
AS WELL AS  
THE SMALL  
ONES



WITH this miller  
keyseats are  
milled of uniform  
width and depth,  
and parallel sides.  
This is accom-  
plished by a rotary  
cutter which mills  
keyseats in one cut,  
it being only neces-  
sary to pass the  
tool through the  
hole just once.

The miller fits exactly  
in the hole being key-  
seated and the cutter is  
centrally located in the  
tool, making it impos-  
sible to mill inaccurate  
keyseats. The guide  
following up the cutter  
assures good keyseats  
in alignment.

The National Keyseat-  
ing Miller is used in  
the drilling machine,  
and can be chucked as  
readily as any straight-  
shank drill.

It mills keyseats in  
places shaper, planer  
and keyseating ma-  
chines can't reach.

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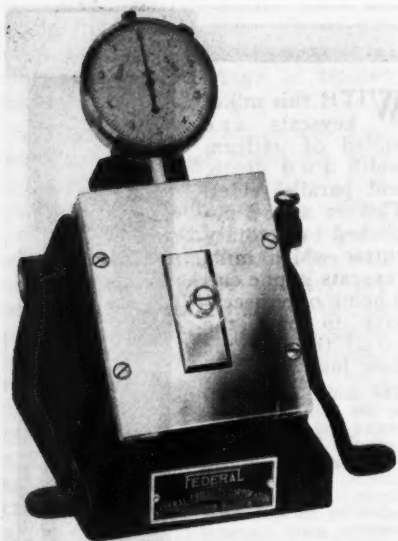
National Machine Tool Co.

2271 Spring Grove Avenue  
CINCINNATI, OHIO, U. S. A.

## New Shop Equipment

### Federal Model "36" Small Hole Gage

For measuring roundness and size variations of holes from  $\frac{3}{8}$ -inch up to  $1\frac{1}{2}$  inches, the Federal Products Cor-



Federal Model "36" Small Hole Gage.

poration, of Providence, R. I., has placed on the market the model "36" Federal Small Hole Gage.

The work to be gauged is placed on the gage jaws, and a slight movement of the lever on either side of the gage instantly registers on the indicator the exact size of the hole. Out-of-round holes are quickly determined by merely revolving the work on the jaws. The gage instantly tells you if the hole is out of round and how much. It is said that with this instrument parts can be gauged as rapidly as the operator can place them on the gage jaws.

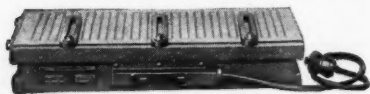
The gage jaws are available in four sizes,  $\frac{3}{8}$ -inch to  $\frac{1}{2}$ -inch,  $\frac{1}{2}$ -inch to  $\frac{3}{4}$ -inch,  $\frac{3}{4}$ -inch to  $1\frac{1}{8}$ -inch, and  $1\frac{1}{8}$  inches to  $1\frac{1}{2}$  inches, but only one size is furnished with the gage as standard equipment. The indicator is  $2\frac{3}{4}$  inches in diameter and is graduated by ten-thousandths of an inch. The one-thousandths of an inch graduations are  $\frac{1}{4}$ -inch apart. By removing the top plate the gage can be quickly set to measure holes of different sizes.

According to the manufacturer the greatest advantage of this gage lies in the fact that the operator reads at a glance the exact size of the hole, whereas a plug gage merely indicates whether a hole is within the required limits or not.

### Taft-Peirce "Super-Power" Magnetic Chuck

The Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island, has recently placed on the market the "Super Power" Magnetic Chuck shown in the illustration. It is claimed that the great holding power, increased magnetic surface, and heavier magnetic flux which are features of this chuck allow a greater variety of set-ups than have been heretofore possible.

To test the waterproof construction of this chuck, it was submerged for over



Taft-Peirce "Super-Power" Magnetic Chuck.

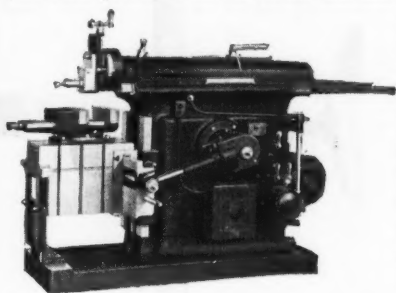
six months in a grinding compound with the face plate removed and under normal load daily without the slightest sign of deterioration being observed.

Along with the new chuck this firm has developed a new demagnetizing switch of the field discharge type. The switch absorbs and dissipates the ex-

## "Short and Snappy"

"Nobody wants to read a long story in a trade paper advertisement; write a piece of short, snappy copy for the next Shaper advertisement—that should be easy, it's a mighty good tool judged by every standard of the best practice in modern machine tool design." Those were the instructions.

The copy is above, dictated by the speaker in his enthusiasm for a fine machine. "Short and Snappy" indicate action. Let yours be to send for complete details of the Rockford Hy-Service Shaper—NOW.



### OTHER PRODUCTS

SHAPER-PLANERS  
ROCKFORD "ECONOMY" LATHES  
DRILLING MACHINES

## Rockford Machine Tool Co.

2414 KISHWAUKEE STREET

ROCKFORD, ILL

## TUNGSTEN CARBIDE TOOLS

*Hold No Terrors For*

## "NIELSEN" LIVE CENTERS



Users of Tungsten Carbide Tools have found that "Nielsen Live Centers" stand up under the gruelling high speeds necessary in the use of these tools.

Nielsen thoroughly tested centers have the required accuracy for all turning and grinding jobs, and are guaranteed against defects in material and workmanship.

*Send For Circular*



## NIELSEN, INC.

LAWTON

MICHIGAN

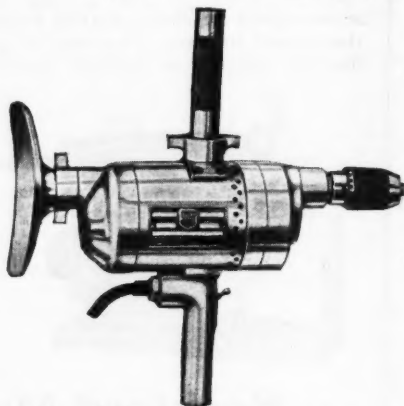
cessive voltage surge at the moment of discharge, without permitting it to pass through the coils of the chuck. A separate contact, automatic in operation and arranged within the switch itself, carries all excessive voltage induced at the break of the circuit to heavy-duty resistors outside the chuck coil circuit where it is absorbed. No additional relays or moving parts are required, and all parts of the switch are designed to provide rugged and durable construction.

### Goodell-Pratt "Super" Electric Drill

The Goodell-Pratt Co., of Greenfield, Mass., has placed on the market their new "Super" Electric Drill, which has the top of the chuck even with the top of the drill to allow close-up drilling against walls, ceilings and other projections. A gear-operated chuck is used, the jaws of which grip tighter as the torsional strain exerted by the drill is increased. The key of this chuck is used only in emergency or under abnormal conditions, as tremendous grip-

ping power is secured by hand-tightening alone, and may be loosened with equal ease.

Ball bearings have been eliminated from the armature shaft, except in the thrust, as long sleeve bearings of high-



Goodell-Pratt "Super" Electric Drill.

speed bearing metal have been found more efficient and lasting for the high speeds of the armature. A wick-oiling system, sealed against leakage and dirt, provides ample lubrication for the armature bearings.

To keep the frame and handle comfortably cool, a fan is mounted in perfect balance on the armature shaft in a separate chamber between the armature and gear case. The air is drawn through holes in the handle cap passing through the entire motor and expelled through holes in the periphery of the frame. The possibility of dirt and dust being drawn in when the drill is laid down with the motor running has been practically eliminated due to the location of the intake holes.

The non-kinking flexible cable is fastened to the body of the drill with a patented three-jaw lock, making it impossible to pull or jerk out the cable, and relieving the strain on the terminals. The patented switch gives instantaneous control and is also very easy to operate.

Goodell-Pratt "Super" Electric Drills are made in various sizes for heavy duty, light duty, or standard work, with a complete line of accessories, such as drill stands, bench clamps, etc.

### **LUFKIN** Thickness Gages

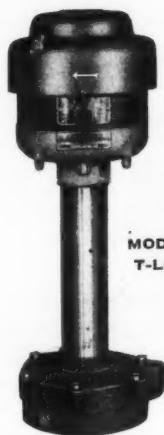


No. 126T offers a wide range of thicknesses, and the Patented Lock Nut holds firmly in place any leaf or leaves.

Ask your tool dealer to see them  
Send for Catalog No. 3

**THE LUFKIN RULE CO.**  
SAGINAW, MICH.

# "GUSHER" Coolant Pumps



MODEL  
T-L-O

**GREATER PUMPING  
CAPACITY ON  
LESS POWER**

*Write for Information*

**The Ruthman Machinery Co.**  
Front and Pike Streets  
CINCINNATI, O.

# An Absolutely Unbreakable Coupling



*Send  
for your  
sample entirely  
at our risk*

**Q**UICK-AS-WINK Hose Couplings are made of Tobin Bronze and are so strongly constructed that no hammering, denting or banging can put them out of working order. Mud or dirt will not clog them. Nothing about them to break. Nothing to get out of adjustment. One second will connect or disconnect them, but no amount of usage will cause them to come apart accidentally.

## For Any Hose Connection

For any industrial hose connection. Every coupling weakness has been overcome. Quick-As-Winks will stand pressure from one ounce to a thousand pounds. Hose life is quadrupled. Delays are eliminated. Accidents prevented. Costs reduced and work speeded up.

## Swivel Freely But Can't Leak

An absolutely tight joint that will not leak is always maintained, but which swivels freely, preventing hose kinks and strain. Line is always straight and free.

Write for details and ask for sample. Do not take our word for this. Try one on the job and give it the toughest, roughest usage.

**C. B. HUNT & SON**  
639 McKINLEY AVE., SALEM, OHIO

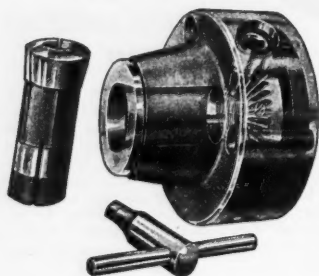
# Quick-As-Wink

AS QUICK IN OPERATION AS ITS NAME

Collets of larger than usual size taken by this

*New*

## Cushman Nose Type COLLET CHUCK



**THIS** chuck takes collets from  $\frac{1}{2}$ " to  $1\frac{3}{4}$ " inclusive, and any bar that will pass through the spindle can be held. It is mounted on spindle nose by bolting to a plate the same way that a lathe chuck would be.

The body is a solid piece of steel, heat-treated and ground perfectly true on both outer and inner surfaces.

Two ground bearings in the collet provide for accuracy in holding the work.

Discs and pinions are of a fine grade of alloy steel, carefully heat-treated. The special type collets can be obtained in sizes from  $\frac{1}{2}$ " to  $1\frac{3}{4}$ ", inclusive, from us or from our distributors.

*Send for Details and Prices*

### THE CUSHMAN CHUCK CO.

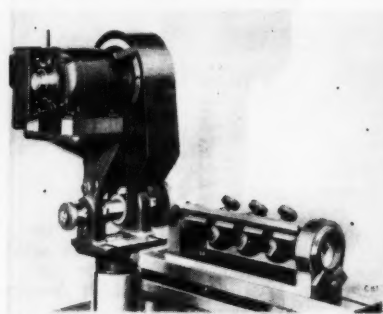
805 Windsor Street

HARTFORD CONNECTICUT

## Special Fixture For Regrinding Wearing Surfaces of Centerless Grinder Support Blades

The Cincinnati Milling Machine Company, Cincinnati, Ohio, has developed a new attachment to be used with its No.  $1\frac{1}{2}$  Plain Cutter and Tool Grinder for regrinding the wearing surfaces of all standard support blades for the Nos. 2, 3 and 4 Centerless Grinders manufactured by Cincinnati Grinders, Incorporated.

Blades should be reground to eliminate the hollow which results from wear and thus produces chatter, out-of-round-



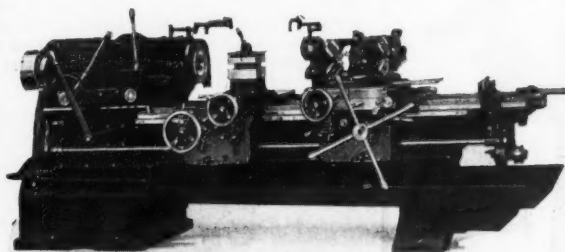
Fixture for regrinding centerless grinder support blades

ness and inaccurate work. Then, too, these troubles may often be corrected by changing the blade angle, which can easily be done with this equipment. The blades that are reground will not be affected by warping because they are held in the fixture in the same manner as on the grinder. Therefore, properly-ground blades will enable the user to obtain accurate work, prevent chatter and eliminate that constant attention and worry. These are sure to bring better results to the centerless grinder user.

The time required to make the set-up is only two minutes and the support blades are finished all over, except the wearing surface, prior to the grinding operation. The fixture is made of aluminum and is very rigidly constructed. It will enable support blades with the maximum length of  $16\frac{1}{8}$ -in.,  $\frac{3}{4}$ -in. wide and 4-in. high to be ground at any angle from a flat top to 45 degrees. This

## No. 3 Acme Heavy Type Universal Turret Lathe with DUO CONTROL

Higher operating efficiency, together with simplified design, makes this Acme Turret Lathe an unequalled producer on all work within range.



### DUO CONTROL

#### Turret Lathes Built in These Sizes

No. 1 — Semi- and Full Universal, 2½" capacity.

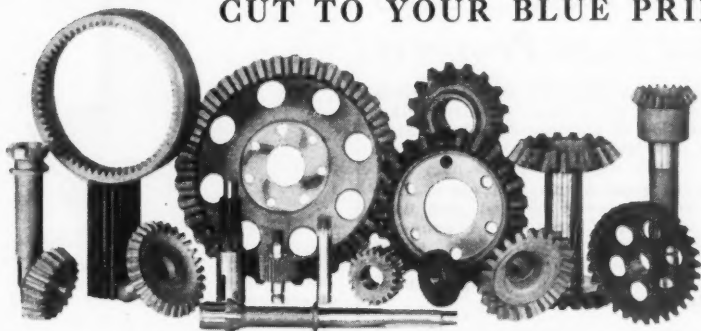
No. 2 — Semi- and Full Universal 3¼" capacity.

No. 3 — Semi- and Full Universal, 3½" spindle capacity.

17" and 4½" Semi- and Full Universal, 4½" spindle capacity.

THE ACME MACHINE TOOL CO., Cincinnati, Ohio

## SPUR — SPIRAL — BEVEL — WORM CUT TO YOUR BLUE PRINT



Our Gear Cutting department produces to meet close tolerances. These gears meet rigid inspection as is evidenced in our production of aircraft and automotive timing gears.

*Let us quote from your blue print on your next requirements.*

**The Steel Products Engineering Co., Springfield, O.**

*Specialists In General Production Contract Work*

---

**SHARP TOOLS CUT COSTS**


---



## GRAND RAPIDS TAP GRINDERS

### *Grind Taps Properly*

**T**HE Grand Rapids Tap Grinder grinds all flutes of a tap exactly alike. The operation of this machine is so simple that unskilled operators can produce accurate work at high speeds.

A properly ground tap will tap a hole true to size, properly located, and with smooth, accurate threads. A properly ground tap cuts faster, stays sharp longer, and produces more and better work. The Grand Rapids Tap Grinder grinds taps properly.

*Write for Bulletins*

**GALLMEYER & LIVINGSTON CO.**

348 Straight Ave., S. W.  
GRAND RAPIDS, MICH.

---

fixture can be purchased for use on a cutter grinder already in use; or it is possible to purchase a stripped No. 1½ Plain Cincinnati Cutter and Tool Grinder equipped with the fixture.

### Hill-Curtis Electrically-Driven Grinding Machine

The new 6-inch and 8-inch electrically driven grinding machine recently placed on the market by the Hill-Curtis Company, Kalamazoo, Michigan, is built in both bench and pedestal types, and will be furnished with either alternating or



Hill-Curtis Electrically-Driven Grinding Machine.

direct current motor for any standard specifications.

Having no holes or open slots in the motor housing, end bells, etc., the motor and bearings are protected from any accumulation of emery grit and dust. Even the oversize bearings mounted in the end head in close proximity to the wheels are completely enclosed and protected from dust and dirt.

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4	4
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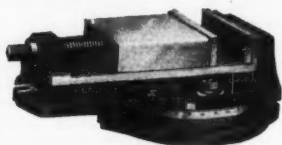
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Write

SH-3251

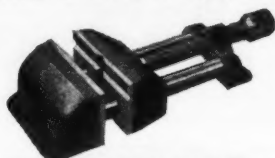
## Sheldon Milling Machine Vises



Furnished Both Plain and With Swivel Base.  
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws	Jaws Open	PLAIN VISE		SWIVEL VISE	
				Wt., lbs.	Price	Wt., lbs.	Price
3	3 1/2"	1 3/8"	2 1/2"	15	\$16.00	25	\$20.00
4	4 1/2"	1 3/8"	3 1/2"	30	\$20.00	45	\$24.00
6	6 1/2"	2"	4 1/2"	70	\$30.00	90	\$40.00
8	8 1/2"	2 1/2"	7"	160	\$45.00	225	\$60.00

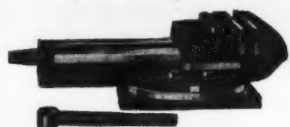
## Sheldon Drill Press Vises



Guide Bars are Hardened and Ground.  
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws over Guide Bars	Full Depth of Jaws	Jaws Open	Wt., lbs.	Price
D 4	4 1/2"	1 3/8"	3"	4"	15	\$12.00
D 6	6 1/2"	1 3/8"	3 1/2"	6"	35	\$18.00
D 9	9"	2 1/2"	4 1/2"	9"	70	\$24.00

## Sheldon Shaper Vises



SPECIFICATIONS AND PRICES:

No.	Size of Jaws	Vise Opens	Bolt Hole Spacing*	Wt., lbs.	Price
1	12" x 2 1/4"	12 1/4"	7 1/4"	175	\$120.00
2	14" x 2 3/4"	13 1/2"	8 1/2"	240	\$135.00

\*Distance between holes can be changed without additional charge.

Write for Catalog Describing Full Line of SHELTON Tools For the Machine Shop.

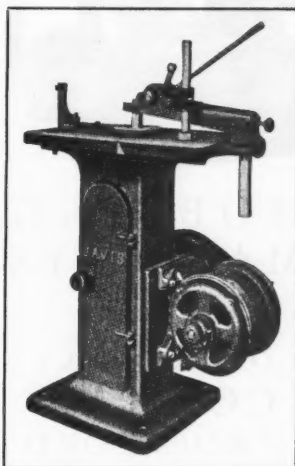
## SHELDON MACHINE Co.

3251 Cottage Grove Avenue

CHICAGO, ILL.

# 100

## PER HOUR ON THE



## DAVIS KEYSEATER

The Nash Motors Company has used three No. 2 Davis Keyseaters for cutting steel oil pump gears. One hundred of these gears per hour has been their average production with this machine.

The Davis Keyseater will efficiently and economically handle any job from 1/16 to 1 inch wide, and up to 12 inches. It also will cut taper keyways. Shall we send you full information?

**SEND COUPON NOW!**

### DAVIS KEYSEATER CO.

250 MILL STREET, ROCHESTER, N.Y.

I am interested in the Davis Keyseater. Send me full information.

Name.....

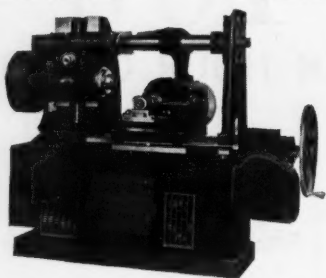
Firm.....

Address.....

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**SERVICE**  
*Is Our Motto*

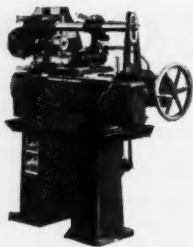
**QUALITY**  
*Our Creed*



## HOBGING MACHINES

*by*

**BARBER-  
COLMAN**  
*of ROCKFORD*



**4** SIZES of Hobbing Machines . . . two sizes "universal" type for spur and spiral gears, sprockets, ratchets, splined shafts and other hobbled forms . . . two sizes for high production on spur gears and splined shafts only . . . Quality Products . . . Send for our circulars.

**BARBER-COLMAN  
COMPANY**

General Offices and Plant, Rockford, Ill., U.S.A.

A two-pole underwriter's approved quick make-and-break switch is supplied as standard equipment. The wheel guards and tool rests, adjustable to the wear of the wheel, can be easily removed if necessary.

An improved commutating type repulsion-induction motor, which has no dragging centrifugal switch, is used on the single phase, alternating-current machines. The Hill-Curtis Company claims that low voltage has no objectionable effect on these motors and as the starting current is unusually low, they are ideal for attaching to a convenient lighting circuit outlet.

The motors used in these machines are guaranteed to develop their rated horse-power, and will withstand momentary overload of 100 per cent beyond normal capacity.

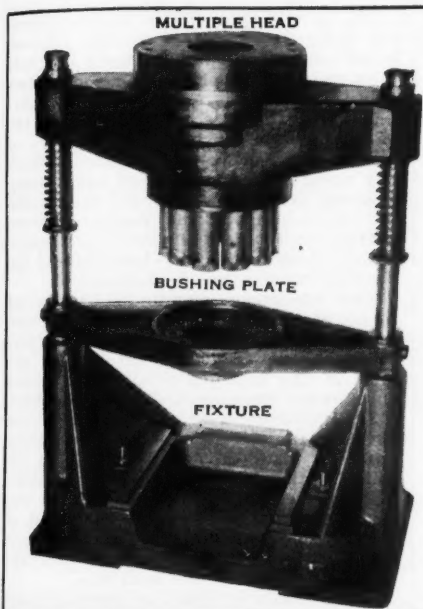
### Hisey-Wolf Dual Motored Tex-Drive Buffer

The Hisey-Wolf Machine Company, of Cincinnati, Ohio, has recently added to its line of electric machine tools a dual-motored buffing machine with independent spindle controls. The distinctive



Hisey-Wolf Dual-Motored Tex-Drive Buffer.

feature of this machine is the two separate spindles, which are operated independently by separate motors. This arrangement allows each spindle to run at different speeds at the same time. Each motor is mounted on a solid cast iron sub-base, and secured at all four corners by bolts placed in grooves. The starters are mounted on the inside of the end doors, and the starter buttons are conveniently located in the top front of the column.



## Why Guess About Methods and Cost of Increased Production

*"Krueger"*

### STANDARDIZED

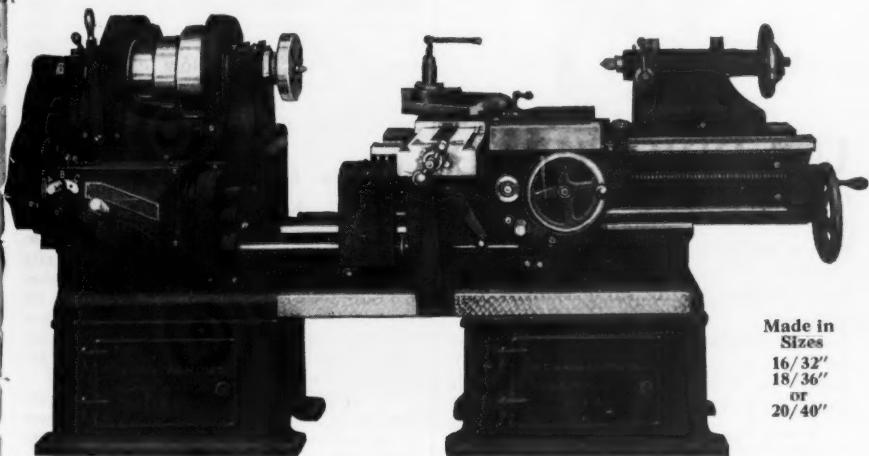
Multiple Head } held in positive  
Bushing Plate } and perfect  
and Fixture } alignment for  
Drilling, Reaming, Boring, Tapping

### OUR SKILLED TOOL ENGINEERS

Will be pleased to furnish complete data and submit quotations on the equipment best suited to your purpose.

**H. R. KRUEGER & CO.**

439 EAST FORT ST., DETROIT, MICH.



Made in  
Sizes  
16/32"  
18/36"  
or  
20/40"

## Rahn-Larmon 18/36" Extension Bed Gap Lathe

A lathe for large or small swing work, ready at all times. Requires no extra rigging up. Takes different distances between centers.

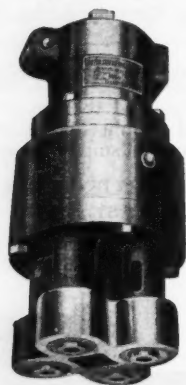
Belt driven or with nine speed all geared motor driven head. Tell us what your requirements are and let us quote you.

**THE RAHN-LARMON CO.**

2935 Spring Grove Ave., Cincinnati, Ohio

4

## Holes At One Time With a



## U.S. DRILL HEAD

**T**HE U. S. Drill Head changes your one-hole-at-a-time drilling machine into a multiple drill, by allowing any number of holes—fifty if necessary—to be drilled in the same time as one hole.

The particular head shown drills four holes at one time, but we make drill heads to drill any number of holes to meet your requirements.

*Send us blue print of your job, and we will show you what you can save by using a U. S. Drill Head.*

**The United States Drill Head Co.**

1954 Riverside Drive

Cincinnati

Ohio, U. S. A.

Due to the spindle and bearing housing being assembled as a unit, all that is necessary to replace a worn out belt is to relieve the belt tension, loosen two bolts on each side of the bearing housing, and lift the complete unit off the base. The spindle bearing boxes are of cast iron and are keyed to the column. A key along the entire base of the bearing housing fits into a keyway in the top of the column. This feature insures perfect realignment of spindle and motor pulleys, regardless of how often the bearing housing has been removed.

The one-piece spindle is made of nickel steel, extra large in diameter, and machined to exact size to insure perfect balance. Flat top threads on the ends of the spindles retain their shape throughout the long life of the machine. To eliminate wear on the spindle threads, the nut for holding the buffing wheel is made of Tobin bronze. It extends to the extreme end of the spindle, fully protecting the threads from dirt and grit. Dust covers on each end of the bearing housing are provided with labyrinth seals to prevent dust and dirt from getting into the bearings.

Ample lubrication is provided by means of oil chambers in the bearing housings which are filled through conveniently located cups. Gages at the back of the bearing housing indicate the oil level, and allow excess oil to escape through overflow vent. A flushing plug at the bottom of the vent permits quick flushing of bearings.

## Rogers Type "W" Reversible Knife Grinder

The latest improvement on the new Rogers Type "W" Reversible Knife Grinder, recently placed on the market by Samuel C. Rogers and Company, 191 Dutton Avenue, Buffalo, N. Y., is that knives can be ground with the cutting edge either up or down by simply reversing the knife bar.

To eliminate vibration and insure perfectly true knife edge grinding, three longitudinal bearings are used to support the slide and knife carriage. An added feature to this machine is the back bearing which has an adjustable steel gib 1-inch wide for taking up possible wear.

This machine will grind a straight or concave bevel and is equipped with an index for gauging the degree of the

# CUT YOUR COSTS!

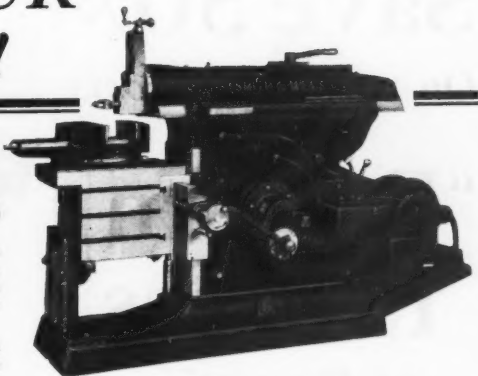
## SMITH & MILLS HIGH SPEED CRANK SHAPERS

are designed for accurate work at high speeds. They shorten production time, which cuts your operating costs. Smith & Mills shapers are equally efficient on tool room or production work.

Smith & Mills modern improvements include "V" type ram with 55 degree ways, splined shafts, heat-treated alloy steel gears, speed box shafts mounted on Timken tapered roller bearings, Twin Disc Clutch, and one shot lubrication system.

WRITE FOR CATALOG!

THE SMITH & MILLS CO., Cincinnati, Ohio



Made in 16, 20, 25 and 32-inch sizes back geared; single-geared in 12 and 14-inch stroke.

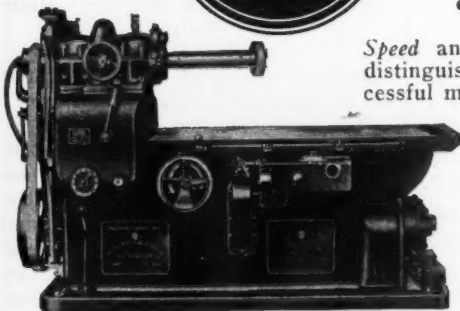
For grinding round holes from 1 1/4" to 15" diameter. Can be equipped with standard angle fixtures or with special quick set-up work holding fixtures.



## More Speed Plus a Better Job

Speed and Accuracy are factors which distinguish the performance of the successful machine tool. Speed is essential to insure rapid, economical production. Accuracy must be rigidly maintained to provide unerring assembly and satisfactory performance of the completed product.

Micro Internal Grinders in your shop will enable you to attain these results with maximum ease and economy.



Micro Model "DG" Internal Grinder

# MICRO MACHINE COMPANY

Bettendorf

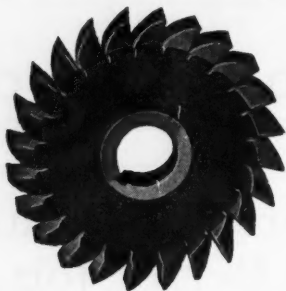
MANUFACTURERS AND DESIGNERS OF  
**PRECISION GRINDERS**  
FOR ALL PURPOSES

Iowa, U-S-A

# Save 50%

*On your cutter costs  
by the*

## "Eastern Process" of Recutting



**T**HIS cutter has been reclaimed by the "EASTERN PROCESS" of recutting. Notice the undercut tooth, the large chip space, and the smooth ground finish. By the "EASTERN PROCESS" milling cutters are recut without annealing or sand blasting.

Send us your worn out cutters today. We pay express charges both ways and guarantee our work. All types of tools accepted.

### Eastern Cutter Salvage Corp.

43-45 Freeman St.

Newark, N. J.

knife bevel. The travel of the knife and carriage are entirely automatic, be-



Rogers Type "W" Reversible Knife Grinder.

ing provided with stops to regulate the distance of travel, according to the length of knife being ground.

The machine stands 3½ feet high upon

### Linestart Motors Require Wider Belts

(Continued from page 60)

standard motors of the same rating on all motors of 10 h. p. and over.

The extensive use of linestart motors indicates that they are rapidly coming into general use. It has been estimated that about 15 per cent of the new motors today are linestart motors, and it is considered probable that five years from now 70 per cent of all new motors will be linestart motors. No doubt by that time motor manufacturers will have realized the need for wider belts, and motors will be equipped with wider pulleys, but until they do, wider pulleys should be specified when ordering linestart motors.

## BROACH for Accuracy—Economy!



Let us show you how to finish more holes—more accurately—and at less cost.

### The American 2-Ton Hydraulic Press

is recommended for broaching connecting rods and work that comes within the 2-ton range. We manufacture presses from 2 tons to 150 tons pressure, also all types of broaching tools.

AMERICAN BROACH & MACHINE CO.  
ANN ARBOR, MICHIGAN

## PROCUNIER



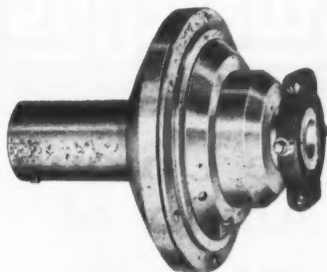
**SAFETY TAPPING ATTACHMENT** with the "Procunier" Safety Friction and "Double-Jaw" tap holder gives greater accuracy, less tap breakage, and more tapped holes to the dollar.

**All Hardened Gears, Special Hardened and Treated Clutches, Balanced Reversing Mechanism.**

With the "Procunier" Safety Friction Device blind holes can be tapped just as easily as through holes, and without danger of breakage.

Don't Hesitate To Ask For a Free Trial Catalogue 102-B gives complete details of "PROCUNIER" Tapping Devices, Quick Change Chucks, Stud Setters and Bench Tapping Machines.

**PROCUNIER SAFETY CHUCK CO.**  
12 So. Clinton St. Chicago, Ill.



**T**HE Conway Disc Clutch is always recognized by its easy engagement, instant release and drag free idling.

Responsible for these efficient functions are large lever ratio, centripetal action and balanced construction.

Besides these, however, are power capacity, long life, all steel plates, enclosure and husky construction.

It's the last word in friction clutches. Let the performance of one sell you many.



**The Conway Clutch Co.**  
1959 W. 6th St., Cincinnati, Ohio

*"The Conway Disc is a  
Splendid Clutch."*

# Stuart Oils

FOR THE "TOUGHEST"  
METAL WORKING CONDITIONS

The Unique  
Ability of

**Stuart's**

**Thred-Kut**

(Pat'd Oct. 19, 1926)

Alloy Steel Cutting Oil

To "Smooth-Out"  
Tough Jobs

should be remembered when  
you are in trouble.

*New 64 page booklet (illustrated)  
mailed upon request.*

ORDER TRIAL DRUM STUART'S  
"THRED-KUT" FROM NEAREST  
OFFICE AND WAREHOUSE

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LOS ANGELES.....	962 E. Fourth St.
NEW HAVEN.....	165 Brewery St.
PHILADELPHIA.....	N. W. Cor. Front and Lehigh Ave.
PITTSBURGH.....	808 Ivy St.
ST. LOUIS.....	1322 Merchant St.
SAN FRANCISCO.....	1866 Folsom St.
TORONTO.....	1170 Yonge St.

**D.A. STUART & CO.**

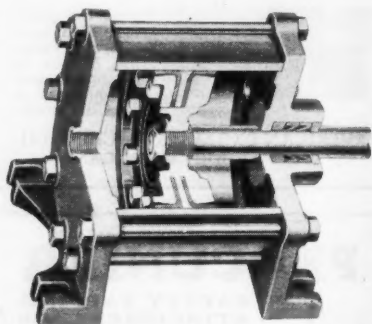
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CHICAGO. U.S.A.  
Warehouses in Principal Centers

a substantial base in which the driving and shifting gears are enclosed and protected from dust and dirt. It is built in five sizes, ranging from 26 inches to 54 inches in capacity. Regular equipment includes 10-inch cup wheel, belting, wheel dresser, water attachment, wrenches and supports for ends of the bed on the two largest sizes.

## Logan Non-Rotating Air Cylinders

The illustration shows the Model "M" of a new line of Logan Air cylinders recently placed on the market by the Logansport Machine Company, of Logansport, Indiana. This new line con-



Logan Model "M" Non-rotating Air Cylinder.

sists of five standard models and eleven sizes ranging from 1½-inch to 16-inch bore, and can be furnished with any length of stroke.

The new design incorporates all the original features of Logan non-rotating air cylinders, to which has been added self-adjustment by air packings to eliminate all hand adjustments, heavier construction to allow for increased air pressure, and enlarged air inlets and outlets to permit quicker action. The packings are made of a composition especially compounded and moulded for use with air.

The manufacturer of this cylinder claims that it meets present day demands for a more powerful gripping pressure and quicker action, and is adaptable to practically all present types of improved production machinery.

# Union HOISTS LIFT HEAVY LOADS



MODEL "A"  
1 Ton Capacity

Send for the  
UNION CHUCK  
Catalog also!

**Union Manufacturing Co.**

*"Makers of Union Chucks"*

New Britain, Conn.

Branch Offices: New York, Chicago, Cincinnati, San Francisco

Union Chain Hoists make light work of lifting heavy loads. An easy, steady pull on the hand chain is all that is required to lift the load. Some of the Union Hoist advantages are:

**Less handchain** handled to lift load.

**Handwheel shaft and driving pinion supported** beyond intermediate gears.

**Each hoist tested to 150% of rated capacity.**

**Load Shaft runs on large roller bearings.** (Load sprocket wheel is reversible.)

**All steel wearing parts are heat treated.**

Many other advantages are explained in the Union Hoist catalog—write for it today!

*Murchey  
Service*



## SCORES AGAIN—

with the new type "G" non-rotating, self-opening die head.

The outstanding feature of the type "G" die head is the positive self-contained trip which will open the head instantly at any predetermined point. This feature permits close-to-shoulder threading and guarantees accurate thread lengths. The head is closed by hand, or by arranging a stop on the machine to engage the closing handle. The chasers can be changed without removing the cap, or taking the head from the machine.

The new MURCHEY style "G" die head is made in sizes up to and including five inches. Write for details.

# MURCHEY

**Machine & Tool Company**

951 PORTER STREET

DETROIT

MICHIGAN

## For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

**Abrasive Grinding Wheels:** The types of wheels, with recommended grades and grains, which should be used for each of the various kinds of grinds are discussed in a booklet which will be sent free to mechanical executives by the Abrasive Company, Philadelphia, Pa.

**Broaching By Modern Methods:** Equipment and tools for finishing round, square or irregular-shaped holes and surfaces by broaching are described and illustrated in a booklet that is issued free by the American Broach & Machine Co., Ann Arbor, Michigan.

**Ames Dial Gages:** The latest types of dial gages for inspection purposes are described in the Ames No. 55 Bulletin, which will be sent free to any machine shop executive. Address B. C. Ames Co., Waltham, Mass.

**Scraping By Power:** Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

**Steel Furniture for the Shop:** The complete line of steel furniture made by the Angle Steel Stool Co., Plainwell, Michigan, including steel stools and chairs, steel foremen's desks, lockers, tables, tool stands, machine tenders, shop boxes and pans, iron bar racks, trucks, bench legs, and bench drawers, is described and illustrated in Catalog "C," which is issued free to machine shop executives.

**Stop Tap Breakage:** A booklet that tells how to stop the breakage of taps, reamers, and other tools, by the use of a friction chuck, also how to use the chuck for setting studs or nuts, has been issued by The Apex Machine Co., 200 Davis Ave., Dayton, Ohio. Sent free upon request.

**Machine Shop Accessories:** Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

**Metal and Wood Saws:** Catalog No. 20 describing saws of all kinds, for both metal and wood. 256 pages of descriptions of saws and sawing machinery. E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.

**Hobs and Milling Cutters:** A complete line of milling cutters and hobs for cutting all kinds of gears, splines, sprockets and other forms is described in Catalog G, issued by the Barber-Colman Company, Rockford, Ill. Descriptions and illustrations of the Barber-Colman hobbing machine and hob-sharpening machines are included. Sent free on request.

**All-Geared Drilling and Tapping Machines:** A catalog describing in detail the various types of all-geared, self-feeding, drilling and tapping machines made by the Barnes Drill Co., 801-851 Chestnut Street, Rockford, Ill., will be sent free upon request.

**Modern Drilling Equipment:** Circulars describing the various types and sizes of Barnes upright drills, multiple drills and horizontal drilling machines made by this company have been issued by the W. F. & John Barnes Co., Rockford, Ill.

**Automatic Oiled Die Sets:** The automatic oiled die sets, die shoes, punch holders, leader pins, bolster plates, bushings, and other standard die parts made by the E. A. Baumbach Manfg. Co., 1806 S. Kilbourn Ave., Chicago, Ill., are described in Catalog No. 5, which has been issued by that company. Sent free upon request.

**"C-V" Chrome Vanadium Wrenches:** A complete line of wrenches made of Chrome Vanadium steel—practically unbreakable—is described in a booklet that has been issued by the Bonney Forge & Tool Works, Allentown, Pa. Copy free upon request.

**Bradford Precision Lathes:** Precision Lathes for the tool room and for general manufacturing purposes, all-

geared and cone types, belt or motor driven, are described and illustrated in a catalog that is issued by The Bradford Machine Tool Co., 657-671 Evans St., Cincinnati, Ohio. The catalog also includes descriptions of taper, relieving, turret and other lathe attachments. Sent free upon request.

**Bradford Unit Type Drill Heads and Tapping Heads** are described and illustrated in a bulletin published by the Bradford Machine Tool Co., 659 Evans Street, Cincinnati, Ohio. The bulletin also describes useful applications of these heads.

**How to Sharpen Cutters:** A series of leaflets, which describe and illustrate the correct methods to employ in sharpening all kinds of cutters, can be obtained, without charge, by addressing Brown & Sharpe Mfg. Co., Providence, R. I.

**High Speed Drill Presses:** A complete line of drill presses that can be run at high speeds with complete safety is described in catalog number 50, issued by the Caneby-Otto Manufacturing Company, Chicago Heights, Ill. This catalog also contains descriptions of other equipment manufactured by this concern. Sent free upon request.

**Gear Data:** The Cincinnati Gear Co., Cincinnati, Ohio, has published Catalog D, which describes and illustrates the various types and kinds of gears made by this firm. The book contains photographs of the plant departments, with descriptions of the equipment employed, and also includes a number of pages of valuable data and reference tables for machine shop use.

**"A Treatise on the Truing and Mounting of Grinding Wheels for Precision Grinding Machines"** is the title of a book that has been published for mechanical executives by Cincinnati Grinders, Inc., Cincinnati, Ohio. Copy free upon request.

**Rapid Traverse Planers:** Cincinnati Hypo Planers, made by the Cincinnati Planer Co., Cincinnati, Ohio, are described in a new catalog that has been issued by this company.

**Shaper Progress:** An illustrated catalog describing the various types of shapers made by the Cincinnati Shaper Co., Cincinnati, Ohio, and including descriptions of Cincinnati Shapers in use in different kinds of plants.

**Handbook For Drillers:** The Cleveland Twist Drill Co., 1242 E. Forty-ninth St., Cleveland, Ohio, has published a book in which the various parts of the twist drill are described, and which tells how to grind a drill correctly. The troubles that result from incorrect grinding are described and illustrated and several chapters are devoted to the subjects of speeds, feeds, materials, cutting compounds, and so on. Sent free upon request.

**Disc, Expansion and Compression Clutches:** The various types of clutches and their uses are discussed in an illustrated booklet that is issued by The Conway Clutch Co., 1959 West Sixth Street, Cincinnati, Ohio.

**Cushman Chucks:** A series of bulletins has been issued by The Cushman Chuck Co., 805 Windsor St., Hartford, Conn., describing the lathe, screw machine, boring mill, drill press and other chucks made by this firm. Sent free upon request.

**Die Makers' Supplies:** A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danyl Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

**Davis Keyseaters:** Recent developments in keyseating methods are discussed in a bulletin that also describes the keyseaters made by the Davis Keyseater Company, 250 Mill St., Rochester, N. Y. Copy free upon request.

**Grinding Wheel Dressers:** All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond



## Nicholson Expanding Mandrels

Convenient setting up equipment that may save its cost setting up a single job. Sizes to fit all bores from  $\frac{1}{2}$ " to 7" diameter inclusive; No. 4 shown, fits bores from 2" to  $2\frac{1}{2}$ ". Send for details and prices.

**W. H. NICHOLSON & COMPANY**

136 OREGON STREET

WILKES-BARRE, PA.

### Anderson Improved Balancing Ways

#### No Leveling Required

A simple and excellent device for balancing, straightening and truing.



Four chilled  
iron discs  
rotate on  
ball bearings

Write For Full Information

Mfd.  
By **Anderson Bros. Mfg. Co.**  
1926 Kishwaukee Street, Rockford, Ill.

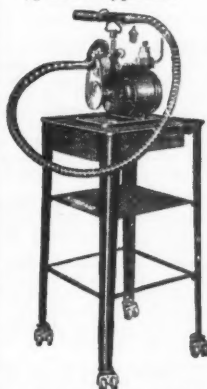
They are made in  
the following sizes:

Swing	Greatest Distance Between Standards	Capacity in Lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

IT PAYS  
TO BUY  
THE BEST



$\frac{1}{4}$  H. P. Type M 5



### FLEXIBLE SHAFTS AND MACHINES

For  
Grinding  
Polishing  
Sanding  
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dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

**Quantity Drilling:** A semi-automatic multiple spindle drilling machine which is designed to produce the maximum of drilled holes in medium or small parts, is described in a pamphlet that is published by the Detroit Machine Tool Co., 5055 Woodward Ave., Detroit, Michigan. Sent free upon request.

**Cut Your Cutter Costs:** How you can cut your cutter costs in half and increase the efficiency of the tools is told in a bulletin that will be sent free upon application to the Eastern Cutter Salvage Corp'n., 43-45 Freeman St., Newark, N. J.

**Interchangeable High Production Tools.** Catalog No. 28, issued free by the Eclipse Interchangeable Counterbore Co., 7410 St. Aubin St., Detroit, Michigan, describes and illustrates the interchangeable counterbores, spot facers, end form cutters, and other end cutting tools made by this firm.

**Precision Measuring Instruments:** The latest types and models of dial indicators, thread lead test gages, pitch gages, thickness gages, dial comparators, and other precision measuring instruments marketed by the Federal Products Corporation, Providence, R. I., are described and illustrated in a book that will be sent free upon application to this firm.

**Silent Self-Lubricating Gears for use in all kinds of machines** are described in a booklet that can be had upon application to Fibroc Insulation Company, Valparaiso, Indiana.

**Formica Silent Composition Gears:** A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

**Fosdick Drills:** This publication gives details as to the design and construction of Fosdick Radial, Upright, and Sensitive Drills. Published by the Fosdick Machine Tool Co., Cincinnati, Ohio.

**Quick-Acting Clamp:** A bulletin describing the "Rapid" drop-forged steel clamp manufactured by the Fountain Equipment & Mfg. Co., 2025 Elm St., Cincinnati, Ohio, has been issued by this firm.

**Modern Grinding Equipment:** The complete line of universal tool and cutter grinders, surface grinders, drill grinders, tap grinders, and other grinding machines made by the Galmeyer & Livingston Co., 336 Straight St., S. W., Grand Rapids, Michigan, is described in a series of bulletins that have been issued by this firm. Free upon request.

**Adjustable Blade Cutters:** Hollow mills, facing tools, face mills, milling cutters and other production tools with adjustable, interchangeable blades are described and illustrated in a booklet that is issued free by the Genesee Manufacturing Co., 141 N. Water St., Rochester, N. Y.

**Greaves-Klusman Lathes:** A book containing complete descriptions of the latest types of lathes made by this firm has been issued by the Greaves-Klusman Tool Co., Oakley, Cincinnati, Ohio.

**Air Is Your Best Helper:** Air will operate your presses, chucks, vise jaws, and other tools more efficiently and at less cost. Catalog MS-11, issued by the Hannafin Mfg. Co., 621-631 S. Kolmar Ave., Chicago, Ill., will show you how it is done. Ask for a copy.

**Drilling and Grinding Electrically:** Catalog M, showing and describing a variety of modern electric portable drills, grinders, and other tools, including floor grinders and buffers, has been issued by The Hisey-Wolf Machine Co., Colerain and Marshall Sts., Cincinnati, Ohio.

**"Quick-As-Wink" Buffing Wheels** that eliminate all disadvantages of rag-buffs, speed output, do better work, and cut buffing costs to the minimum are described in a bulletin that is issued free by C. B. Hunt & Son, 639 McKinley Ave., Salem, Ohio.

**Internal Grinding Equipment:** The latest equipment for grinding holes of all sizes, from small wrist pin holes to the holes in locomotive cylinders, is described and illustrated in a booklet that will be sent free by the Hutto Engineering Co., Inc., 542 Lacoste Ave., Detroit, Michigan.

**Special Mil-Waukee-Mills of Standard Units:** A milling machine of which the base, heads, columns, and other parts are built in standard units, thus enabling the user to order a machine that will be especially adapted for his job, is described and illustrated in Catalog No. 36, issued by the Kearney & Trecker Corporation, Milwaukee, Wis. Free to machine shop executives.

**Standardized Jigs and Fixtures:** Information concerning standardized jigs and fixtures, also all kinds of special equipment for production, can be had by writing to H. R. Krueger & Co., 439 East Fort St., Detroit, Mich.

**Cutter and Tool Grinding:** A book that tells how to grind tools and cutters accurately and which also describes and illustrates the different types of LeBlond Universal Tool Room Grinders will be sent free upon request. Address, The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.

**Air-Operated Work-Holding Devices:** A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

**Rapid-Reading Micrometer:** A new type of rapid-reading micrometer, designed to show the reading in numerals, is described in Catalog No. 5, issued by The Lufkin Rule Co., Saginaw, Michigan. The catalog also contains descriptions of the micrometers, calipers, gauges, scales, squares, bevel protractors, and other tools made by this company. Free upon request.

**Time Saving Machine Equipment:** How machining time can be reduced to the minimum by the use of Wizard chucks, collets and tap holders, turret tool posts, self-centering steadyrests, and other McCroskey equipment is told in a book that is issued by the McCroskey Tool Corporation, Meadville, Penna. Will be sent without charge.

**Lamp Guards:** The various types and kinds of lamp guards made by the McGill Manufacturing Co., Valparaiso, Ind., for factory use are described in a catalog that will be sent free upon request.

**Internal Grinding:** The latest methods of grinding internal surfaces with speed and precision are described and illustrated in literature issued by the Micro Machine Company, Bettendorf, Iowa, builders of Micro Grinders. Copies free upon request.

**Roller Bearing Radial Drills:** The application of Timken roller bearings in the design of modern radial drilling machines is discussed in a bulletin describing "Mor"-Speed Radial Drills, published by the Morris Machine Tool Co., Cincinnati, Ohio.

**Automatic Tapping and Threading Tools** of the latest types and designs are illustrated and described in Catalog No. 25, which has been issued by the Murchey Machine & Tool Co., 951 Porter St., Detroit, Mich. Copy free upon request.

**"The 'Hole' Story in One Word"** is the title of a publication that has been issued by The National Automatic Tool Co., Richmond, Ind. The book gives details as to construction and uses of "Nateco" multiple drilling and tapping machines.

**Milling Internal Keyways:** A simple method of milling keyways in gears, wheel hubs, and other similar parts with the aid of a drill press and a special tool is explained in a booklet that is published by the National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio.

**Save Time with Expanding Mandrels:** How expanding mandrels will solve the problem of turning pieces with odd-size holes, and will increase production on duplicate work, is told in a folder that will be sent free upon request by W. H. Nicholson & Son, 136 Oregon St., Wilkes-Barre, Pa.

**Live Centers:** The complete line of live centers manufactured by Nielsen, Inc., of Lawton, Mich., are fully described in a bulletin issued by this company. This bulletin is illustrated with photographs and blueprints of the Nielsen Center. Mailed free upon request.

**Ball and Roller Bearing Data Sheets:** A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be

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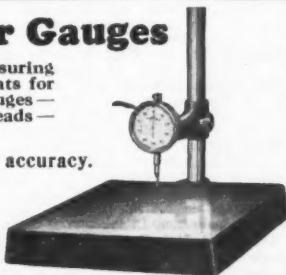
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obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

**Grinding Wheel Information:** A booklet which tells how grinding wheels are made and graded, and which give instructions for mounting wheels, operating speeds for different kinds of work, instructions for truing and dressing, and other information has been issued by the Norton Company, Worcester, Mass. Sent free upon request.

**Correct Cutter Grinding:** How cutter costs can be reduced and more production per grind of cutter obtained is told in Booklet "E," published by The Osterle Machine Co., 3319 Colerain Ave., Cincinnati, Ohio. Sent free upon request.

**Die Making Machines:** How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

**Self-Tapping Sheet Metal Screws:** Screws which are threaded and hardened in such a manner as to enable them to cut their own threads as they are screwed into sheet metal assemblies are described in a folder which is published by the Parker-Kalon Corporation, 192-196 Varick St., New York City, N. Y. Sent free upon request.

**Tapping Devices, Quick-Change Chucks, Stud-Setting Tools and Bench Tappers:** A catalog describing the various types and kinds of tapping, drilling, and stud-setting devices manufactured by the Promcuer Safety Chuck Company, 12 South Clinton Street, Chicago, Ill., can be obtained without charge by addressing this company. The catalog also tells the part that Promcuer tools play in obtaining greater accuracy and less tap breakage.

**Engine, Turret, and Gap Lathes** are described in a series of bulletins that have been issued by The Rahm-Larmon Co., 2935 Spring Grove Ave., Cincinnati, Ohio.

**Pullmore Industrial Clutch:** A multiple disc clutch, made in two types, to run in oil or dry, and which is so built that it can be operated at high speeds, is illustrated and described in a folder that will be sent free by the Rockford Drilling Machine Company, Rockford, Ill.

**Universal Openside Shaper-Planer:** The need of a machine tool to fill the gap between the shaper and the planer has been filled by the development of the Rockford Universal Openside Shaper-Planer, made by the Rockford Machine Tool Co., 2414 Kishwaukee Ave., Rockford, Ill. Full description on request.

**Automatic Lubrication:** Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

**Safety Grinding Wheels:** The complete line of grinding wheels made by the Safety Grinding Wheel & Machine Co., Springfield, Ohio, is described in Catalog No. 11, which is issued by this firm. The book also contains instructions for operating grinding wheels, tables of grinding wheel speeds, pulley calculations, and other information for the user of grinding wheels.

**Saving Time With Small Tools:** A line of time-saving small tools, including "Use-Em-Up" drill sleeve, "Wear-away" chucks, collets, cutters, reamers and tap holders, counterbores, spotfacers, and other tools is described in Catalog 36, issued by Scully-Jones & Co., 1909 S. Rockwell St., Chicago, Ill.

**Equipment For the Shop:** Vices for the bench, drill press, milling machine or shaper; angle plates; adjustable clamps, jacks and other tools for the machine shop, are described and illustrated in a booklet that is published by the Sheldon Machine Co., 3253-55 Cottage Grove Ave., Chicago, Ill. Copy free upon request.

**"Metal Cutting"** is the title of the book that describes the latest methods of cutting metals, and includes descriptions and illustrations of both the band saws and inserted-tool metal-cutting saws made by the Simonds Saws & Steel Co., Fitchburg, Mass. Copy will be sent free upon application to the firm mentioned.

**"Chucks and Their Uses"** is the name of a book which contains a full description of the different kinds of chucks and suggestions for the proper care of chucks, and tells how chucks should be fitted to lathes. It also contains

a number of suggestions for general shop practice. Sent free upon application by The Skinner Chuck Co., New Britain, Conn.

**Shaping with Modern Equipment:** The Smith & Mills Company, 2889-91 Spring Grove Avenue, Cincinnati, Ohio, has issued a booklet which describes and illustrates the line of modern shaping equipment made by this firm. Copy free upon request.

**Cutting Oil Data:** A series of booklets containing valuable information about cutting oils and their uses for thread-cutting, broaching, and general cutting purposes will be sent free to any mechanical executive by D. A. Stuart & Co., 2727 South Troy St., Chicago, Illinois.

**Engineering and Manufacturing Service:** A complete engineering and manufacturing service for manufacturers who are not equipped to handle all of their own designing, experimental, or production work is described, with illustrations of the equipment available, in a bulletin that is issued by The Steel Products Engineering Co., Springfield, Ohio.

**Cutting and Grinding Facts:** A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, Finance Building, Pittsburgh, Pa. Free upon request.

**Flexible Shaft Equipment:** The users of the flexible shaft for drilling, grinding, and other operations is discussed in a booklet which also describes and illustrates the flexible shaft equipment made by N. A. Strand & Co., 5001 N. Lincoln St., Chicago, Ill.

**Rigidmill Principles and Practice:** A book that shows how the Rigidmill can be adapted to various kinds of usual and unusual milling operations, and which describes in detail the work that can be handled by this machine has been issued by the Sundstrand Machine Tool Co., Rockford, Ill. Copy free upon request.

**Roller Bearing Chain Hoists:** The features and advantages embodied in Union Roller Bearing Chain Hoists are set forth in a bulletin which will be sent free to any mechanical executive by the Union Mfg. Co., New Britain, Conn.

**Save Cutting Oil:** How cutting oil can be separated from chips and thus reclaimed by the use of a centrifugal chip "wringer," is told in a bulletin that is issued free by the Tolhurst Machine Works, Troy, N. Y.

**Chuck With Air:** How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

**A Simplified and Improved Drive Control for Machinery:** Two distinct types of plate clutches that have proved successful highly in the driving mechanism of machine tools are described and illustrated in a bulletin that will be sent free by the Twin Disc Clutch Company, Racine, Wis.

**Powerful, Easy-Acting Chain Hoists** of the most modern design are described and illustrated in a booklet that is issued by the Union Manufacturing Co., 296 Church St., New Britain, Conn. Copy free upon request.

**Multiple Drilling With a Single-Spindle Drill:** Methods by which multiple drilling may be done on a single-spindle drill, using multiple spindle drill heads, are discussed in a bulletin that is issued by The United States Drill Head Co., 1954 Riverside Drive, Cincinnati.

**Electrically-Driven Portable Tools:** The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 24, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

**Hardness-Testing With Accuracy and Speed:** The principles of testing for hardness by the use of the Rockwell Hardness Tester are discussed in a booklet which also shows a number of applications of this instrument, published by the Wilson-Maclean Co., Concord Ave. and 143rd St., New York, N. Y. Sent free upon request.



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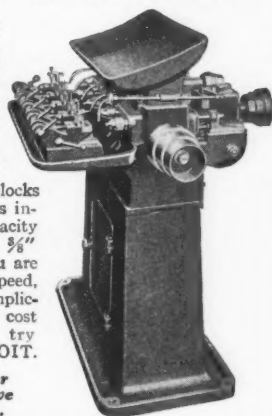
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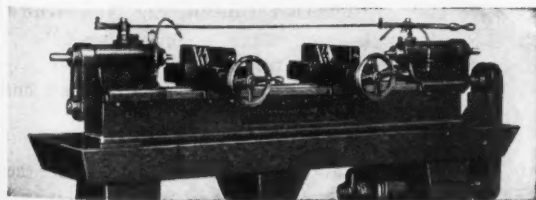
This efficient production machine will drill the work as fast as the operator can load the fixtures. A pull of the lever locks or unlocks the fixtures instantly. Capacity No. 60 to  $\frac{3}{8}$ " drills. If you are looking for speed, accuracy, simplicity and low cost operation, try the DETROIT.

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**Rockford, Illinois**



# Riff=Raff Ravings

By GEO. ALEXANDER MANN  
Raver-in-Chief

Yeh—Myrt—Antique furniture is that which is held onto until the last installment is paid.

## Times Does Change

For local travel they say the motor has displaced the railroad train—Yeh, an' to drive us nutty we now have the traffic rules instead o' the time tables.

## Ain't Ut Turrible?

The prohibition ruling

On our law list is a blotch;

They don't care 'bout your English,

All they ask is, "How's your Scotch?"

Your wife bein' a lover o' antiques won't make it any easier to get her to accept a 1908 fliy fer her birthday.

## Air Programs Breed Profanity

It's a good thing radio fans can't talk back to announcers an' performers—otherwise about 90 per cent of 'em'd have their sets taken out.

## The Way to Prove Ut

A doctor declares

"Kissing shortens life"—

If you don't believe it,

Kiss the wrong wife.

## Fine Prospects—Nex' Year

Each year they're wearin' less.

The girls' spring suits are gems,  
Last year their skirts were ruffles.

This year they're only hems.

## Answer Me That

An Arkansas woman aimed at ner husband with a gun from a distance of ten feet and missed him. Yeh, but how far was he when she fired?

## Troo Enuff

There is sure a fortune

In store for the sap

Who'll make paper napkins

Stay put on your lap.

In mos' cases we wouldn't care how far the radio throws the speaker's voice if it would only throw the speaker with it.

## 'Nother One on the New Wuff

"Do you want a round steak?"

Asked butch of Mrs. Bender

She said, "Oh, the shape don't hurt,

Jes' so it's nice and tender."

Gals usta be modest 'bout their beauty—now they proclaim it from the hose tops.